

COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

Weekly Newspaper

Second-class postage paid at Boston, Mass., and additional mailing offices

Price: \$9/year

December 13, 1972

Vol. VI No. 50



CW Photos by V.J. Farmer

Revamped Last Joint Gives User, Planner New Promise

By Edward J. Bride
and E. Drake Lundell Jr.
Of the CW Staff

ANAHEIM — The crossroads have been passed, and the right road has been taken.

Most of the planners and attendees of last week's Fall Joint Computer Conference used various words to express that conclusion but they all pointed to the increased emphasis on user topics, with half the program devoted to the users of computer technology; the move into vertical sessions aimed at specific markets; and the switch of site to Anaheim.

Last May, the show sponsor, the American Federation of Information Processing Societies, said it was "at the crossroads" of some very big decisions, including the possibility of changing the format to only one conference a year. That decision was made a few weeks later, and this fall conference was seen by many people as the transition.

Users and computer industry representatives had

an assortment of 60 sessions to attend, including four all-day seminars for users in specific industries. There were several half-day technical sessions, and evening sessions on varied topics, from privacy to history, were well-attended.

Users also got a wide-ranging education on hardware, as more new products were introduced than at recent JCCs. The preponderance was in communications and data entry or preparation devices; while the large mainframes were again absent from the exhibit floor.

Latest figures showed that over 20,000 people attended the meeting, an increase over last fall's total of just under 17,000.

Exhibit space was sold out, Afips continually stressed, with 165 organizations filling 410 booths. Two booths were removed from the original layout because supporting columns in the Anaheim Convention Center made it impossible or inconvenient for attendees to see the displays.

The boothspace was given to the IEEE Computer Society and to the Resistors, a student group studying computers.

On the technical program side of the show, the move into vertical sessions got high marks from most attendees, but the more regular technical program drew a mixed reaction.

The sessions devoted to banking, medicine, manufacturing and information data centers were considered well run and informative by most show-goers — and they also drew good crowds.

The banking session in particular was singled out by users and top management in banks for its organization and content, and the manufacturing received much the same type of reaction.

On the other side of the technical program
(Continued on page 6)

Shopping Around

Goofy and Pluto learn about terminals from Courier representative.

End Users Reap New Products Bonus

System Replaces 270X-Type Units

By Ronald A. Frank
Of the CW Staff

ANAHEIM — The FJCC communications and terminal products area included devices specifically tailored to meet the problems of users. In most cases the specialized products stressed improved cost/performance features.

Several products combined previously separated functions to simplify the job of the operator. Included in this group was the Parallel Interface Extender (Pix) system from Paradyne Corp. which replaces IBM 360/370 270X-type line controllers in addition to terminal and modem functions.

Northern Telecom, a subsidiary of Northern Electric Co. of Canada, showed its low-cost Logic 16 data input set that combines the functions of a Touch-Tone-type phone with an acoustic coupler and a 16 character numeric display.

Designed for input applications such as credit card verifications, the device allows an operator to enter a customer's account number into the display before transmitting the data through the coupler to an audio-response equipped CPU. The numeric data can be entered in local mode and edited as required before the call is placed.

Northern Telecom has scheduled first
(Continued on Page 2)

Floppy Disk Heart Of Data Entry Unit

By Michael Weinstein
Of the CW Staff

ANAHEIM — Cost breakthroughs, new technology advances and a proliferation of application-oriented systems made the Fall Joint Computer Conference a show with new products introduced to solve specific and costly applications.

Effective use of floppy disks by Potter Instruments' DDS 1073 data station offers users a low cost replacement for card punch data entry operations, according to the company.

The basic data entry and storage system is a combination of three integrated subsystems: 029-type keyboard with internal microprogramming for editing functions, 132 line/min printer and lightweight plastic floppy disk dynamic storage unit.

The heart of the system is the eight-in. floppy disk which is loaded into the memory drive system through a loading slot. When the slot is closed it automatically aligns the disk for recording operation, the firm stated.

Each \$4 disk unit has a capacity of around 650K bits of information.

Once the floppy disk unit is inserted, data is input by an operator from the keyboard or under automatic program control with optional switching from program to program, a Potter spokesman stated.

Editing capabilities include search by record, search by id number, search by track or sector.

Visual display and output for the unit is the Potter LP3000 printer which operates at 135 line/min.

Once the user has entered the data on the disk and is ready for processing there are three ways to transmit the data to the central computing facility.

The standard method is via the mail with a printer-produced hard copy attached for verification.

A second method is an option to the basic system: converter for transferring
(Continued on Page 2)



John Potter demonstrates Potters' DDS 1073 data entry system for the press.

Challenge Issued

DPers 'Fail' Social Role

By E. Drake Lundell Jr.
Of the CW Staff

ANAHEIM — Computer people have traditionally failed as social activists.

Joseph T. Rigo, assistant vice-president at Bankers Trust Co., indicated as much here last week in a speech challenging computer people to make a greater effort to carry through on projects for the larger social good.

Rigo, speaking at a meeting of the ACM Special Interest Group on Computerized Society, noted in the past eight years there have been five great social movements: civil rights, antiwar, antipoverty, environmentalism and consumerism.

In each of the cases, he noted, there has been much initial interest by DPers which then subsided somewhat into a "more sustainable" position in society at large.

"Each stirred up computer people wanting to do something for society," he said, indicating that he was talking of the general "run-of-the-mill" DP person who held a full-time job, but who wanted to make some larger contribution to society.

"We look for some way to help change the world to make life better for other people without losing up our own lives in the process," he said.

But on the whole, he added, after the initial enthusiasm for the new cause

passes the computer people fade from the scene when the hard work begins.

One of the problems, he noted, was that computer people by themselves couldn't address many of the issues at hand and would have to join with other organizations to accomplish their objectives.

Another problem was that most of the people with whom computer people must interface are lawyers who can only think in terms of legislation or litigation to help solve the social problems.

Another problem, he noted, was that computer people often weren't experts in the areas that were of concern to the various organizations dealing with social issues, and the organizations often didn't want to have amateurs helping them.

This leads to another problem — often computer people sold socially active groups on ambitious computer-based projects, but when the time came for the hard work to implement the plans, the computer experts often disappeared.

But, nevertheless, "it is time for our community and social organizations to learn how to pool professional skills to solve problems. People who are experts in the problem area can work with those who are expert in data processing or some other field to develop solutions that neither could find alone," Rigo stated.

On the Inside

Evaluate the Options
Before Optimizing OS — Page 10

Electronic Transactions
Can Cut Banks Paper Jams— Page 12

Communications	27
Computer Industry	37
Editorial	20
Financial	53
Software/Services	25
Systems/Peripherals	33

Controllers, Modems, Terminals Emphasize Price/Performance

(Continued from Page 1)

U.S. deliveries of the Logic 16 for the second quarter of 1973 at a price of \$250. The LED display is powered through a transformer from a 110 voltage source, but battery power may be included in later models, a spokesman said.

Northern Telecom also showed an "all-digital" modem which uses conditioned diphase modulation techniques. Essentially, the method requires no carrier frequency and it can operate at speeds from 2,400 to 9,600 bit/sec. The unit is priced at \$900 with alarm and supervisory options. The data set will be available in the first quarter of 1973. Northern Telecom is at 140 Federal St. in Boston.

Remote Capabilities

The Paradyne Pix system works with most IBM printers and card readers and provides users with a remote communications capability that connects directly into a 360 or 370 multiplexer channel over dial-up or private lines. Since the Pix system includes line control and error control synchronization it eliminates the need for communications access methods such as Btam. The system allows the user's main CPU to transmit data to remote sites equipped with card reader/printer combinations using the same software that is used to communicate with "local unit record peripherals," Paradyne said.

The Pix system includes a control unit which can accommodate up to 16 half-duplex or eight full-duplex line modules. The control unit emulates the IBM 2821 Card/Print Control Unit which is supported with standard software, Paradyne said.

The communications system can be used with 360 and 370 CPUs and the IBM

1403 printer, 2540 card reader, and similar equipment.

The system interfaces with one high speed position on the CPU multiplexer channel. A typical system of one control unit with one line module costs \$400/mo without data compression. Additional line modules cost \$250 each and the data compression capability adds \$150/mo. A remote Pix capability costs \$250/mo/channel. Deliveries are scheduled for the first quarter of 1973.

Centronics introduced its 401 CRT display terminal which can display up to 132 characters in a 5 by 7 dot matrix screen, which is equivalent to 10-point type, the company said. The CRT can transmit at 4,800 bit/sec using the 63-character Ascii set.

Five key-selected data flow paths are available to the operator and the cursor is controlled by separate keys so that selective editing is possible, the company said. The CRT costs \$1,495 and is available for 30 day delivery.

Teletype Corp. showed its Model 38 TTY with an adding machine cluster that will be available in the first quarter of 1973. The feature adds \$38/mo to the 10 char./sec terminal, a spokesman said.

Computer Devices Inc. introduced an APL portable thermal-printing terminal available with either Ascii or IBM 2741 character sets.

Multics compatible keyboard and such costs \$3,100 with additional costs for specific keyboards ranging from \$125 to \$500 for the APL/Ascii capability. First deliveries of the device are scheduled for early next year.

Com Data introduced an acoustic coupler specifically designed for Model 33 TTY users. The Bell-compatible unit includes a carrier indicator and switch selectable full- or half-duplex operation. It is priced at \$147 with a Model 33-type connector for installation by the user, the company said.

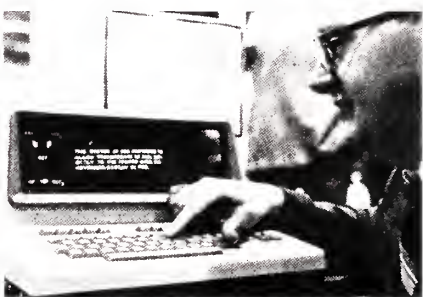


CW Photos by Ronald A. Frank

Suzanne Engles demonstrates credit verification with Northern Telecom Logic 16 data input unit.



Paradyne PIX System



Centronics 401 CRT unit gets a workout.



Inforex Keyscan System combines OCR and key-to-disk technology.



CW Photos by V.J. Farmer

Data Products' Charaband Print Train

Printer, Tape Drives Offered

(Continued from Page 1)

data to IBM-compatible tape. This unit has a flexible disk drive and produces IBM-compatible tape in 1,600 bit/in. PE format, the spokesman stated.

A third alternative is the Potter 6780 bisynchronous modem - costing \$4,650 - which can be attached for direct on-line data transmission.

A basic data station - keyboard, printer, and floppy disk recording unit - costs about \$7,500, including service, Potter said.

The firm is located at 532 Broad Hollow Road, Melville, N.Y. 11746.

New Print Train

Data Products introduced a new high-speed impact line printer featuring a different concept in print trains which the firm stated will reduce the most common printer maintenance problem - frictional wear on the train itself.

The Charaband print train mounts on the 2550 printer so that when viewed from the front it looks like a tank tread with character slugs mounted on either side of the thin edge of the band.

By revolving the bank in this manner there is no sliding friction as elements move around the spindles, a spokesman said.

Further, since character slugs are placed on both sides, the Charaband is reversible.

With standard 48 character set models, the user has a choice of two speeds: 1,200 line/min for OCR quality printing, and 1,500 line/min for standard hard copy output, the spokesman continued.

First deliveries are expected in June 1973, priced around \$40,000 from 6219 De Soto Ave., Woodland Hills, Calif. 91364.

Document Processor

Inforex unveiled a system for users who process invoices against checks. The system is built on a marriage of Optical Character Recognition (OCR) technology and the key-to-disk entry technology employed in their 1301 and 1302 key entry systems.

The Keyscan system is used to relate the information coming in on bills and vouchers against the customer's check for services.

The system optically scans numeric data from the voucher and enters the data - in MICR coding - on the check.

As each individual check is verified against the billing voucher information is also sent to a central unit for storage, creating a permanent record of all transactions.

The Keyscan system will be available for installation in the second quarter of 1973. Rental cost for the basic system control facility - Model 1380 Control Unit and 1282 Supervisor's Station - is \$1,200/mo. Each Keyscan station is \$300/mo which includes maintenance from the firm at 21 North Ave., Burlington, Mass. 01803.

Computer Machinery Corp. (CMC) unveiled what it claims is the largest data entry system available to the end user.

The CMC 18 system supports up to 64 Keystations with 29M bytes of intermediate disk storage. Individual keystations can be either panel display units

for high production work or video display units for verification, a spokesman stated.

A system supervisor controls and monitors operation using a video display unit and hard copy audit trails. The unit is designed to communicate with remote terminals, other data entry systems or IBM systems via communications lines, he noted.

Basic system configuration is a 29M byte 2314-type disk subsystem, magnetic tape unit, supervisory video display unit, 135 line/min printer and a PDP-11 mini-computer.

Lease price for the system is \$2,800/mo plus \$70 for each keystation from 100 Wilshire Blvd., Santa Monica Calif. 90401.

MDS Tape System

Mohawk Data Sciences Corp. will offer users a family of magnetic tape subsystems as a replacement for IBM 3410/3411 subsystems.

The MDS computer tape subsystems are plug-compatible with IBM's System 3, 360 and 370, and are also compatible with other IBM subsystems, the firm's spokesman stated.

The product group consists of an 8410 tape drive, and an 8411 tape drive and controller. Each is available in a choice of three models: Model 2, with a tape read/write speed of 25 in./sec; Model 3, at 50 in./sec; and Model 4, at 75 in./sec.

The Model 2 has a transfer rate of 40 Kbyte/sec and rewind speed of 250 in./sec; Model 3 performs at 80 kbyte/sec and 250 in./sec; and Model 4 transfers at 120 kbyte/sec and rewinds at 500 in./sec.

The units will cost from \$180 to \$270/mo, about 10% lower than IBM counterparts, according to Mohawk in Herkimer, N.Y.

The Randomex exhibit was highlighted by a new unit for cleaning disk packs.

The portable Model 335 - a little larger than the proverbial breadbox - cleans 3336-, 2316- and 1316-type packs, the firm stated.

Brush assemblies perform the actual cleaning and resemble a read head in operation as they brush over the surface of each disk.

Brushes are rinsed and re-soaked with filtered solution before each cleaning pass, the firm said.

Priced at \$3,750 it is available from 27303 Warrior Drive, Palos Verdes Peninsula, Calif. 90274.

Ampex combined two IBM-replacement computer tape drives in a single compact cabinet to reduce users' floor space requirements by 50%, according to the firm.

The package contains two Ampex TM-34 tape drives in the same space required for a single IBM 3420 or equivalent tape drive. The TM-34, introduced as a single drive last year, is priced an average of 15% below the IBM 3420, according to Ampex. It is available both singly and in the twin configuration.

A spokesman said the twin TM-34 package requires 6.25 square feet, including service area.

Two Ampex Model TM-34s are available at a two-year lease rate of \$850, including maintenance, or at \$35,000 purchase price.

COMPUTERWORLD
THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY
TM Reg. U.S. Pat. Off.

ROBERT M. PATTERSON, executive editor.
V.J. FARMER, news editor. RONALD A. FRANK, technical news editor. E. DRAKE LUNDELL JR., computer industry editor. DONALD LEAVITT, software editor. EDWARD BRIDE, JUDITH KRAMER, MARY UPTON, MICHAEL WEINSTEIN, staff writers. MARVIN ARONSON, LESLIE FLANAGAN, copy editors. PATRICIA M. GAUVREAU, MARGUERITE Y. ZIENTARA, editorial assistants.

ALAN TAYLOR, J. DANIEL COUGER, DAVID E. FERGUSON, FRANK GREENWOOD, columnists.

J.H. BONNETT, European bureau.

NEAL WILDER, national sales manager. DOROTHY TRAVIS, sales administrator. FRANCES BLACKLER, market research.

LEETE DOTY, production manager. HENRY FLING, production supervisor.

EDITORIAL OFFICES: 797 Washington St., Newton, Mass. 02160. Phone: (617) 332-5606. Telex: 710-335-6635. Europe: Computerworld, c/o IDC Europa Ltd., 59 Grays Inn Rd., London, W.C.1, England (01-242-8908).

Second-class postage paid at Boston, Mass. and additional mailing offices. Published weekly (except: a single combined issue for the last week in December and the first week in January) by Computerworld, Inc., 797 Washington Street, Newton, Mass. 02160. © 1972 by Computerworld, Inc.

Reproduction of material appearing in Computerworld is strictly forbidden without written permission. Send all requests to publication manager.

25 cents a copy; \$9 a year in the U.S.; \$10 a year in Canada; all other foreign, \$25 a year. MARGARET PHELAN, circulation manager. Four weeks' notice required for change of address. Address all subscription correspondence to circulation manager, Computerworld, 797 Washington St., Newton, Mass. 02160.

W. WALTER BOYD, publication manager. PATRICK J. MCGOVERN, publisher.



POSTMASTER: Send Form 3579 (Change of Address) to Computerworld Circulation Dept., 797 Washington St., Newton, Mass. 02160.

Multiprocessors Emerging

Multiple Minis Meaningful for Message Movement

By Ronald A. Frank
Of the CW Staff

ANAHEIM — Multiprocessor systems using multiple CPUs, operating in parallel, are being developed experimentally at several universities and research centers, according to participants at an FJCC session on distributed computing. The concepts in these systems will impact heavily on commercial resource sharing systems, participants agreed.

The multiprocessor system based on interconnected minicomputers now appears to be feasible, according to William A. Wulf from Carnegie-Mellon University (CMU).

Raise Questions

Such systems raise questions concerning the "unknown problems of dividing tasks into subtasks to be executed in parallel," Wulf said.

In a multiprocessor system, each processor is actually a complete CPU with its own local primary memory and controllers for secondary memories and devices, Wulf said.

One multiprocessor system being configured at Carnegie-Mellon joins 16 DEC PDP-11s into a 32 Mbyte system for the real-time analysis of speech data, Wulf explained.

While little is known about multipro-

Museum Art Works on File

FAYETTEVILLE, Ark. The University of Arkansas here will serve as headquarters for a project aimed at establishing a uniform computerized museum data bank system.

At least 20 museums have computerized systems for cataloging data on their collections and there are five major exchange systems in operation, said Robert Chenhall, executive director of the Museum Data Bank Coordinating Committee.

He said the committee plans to set minimal standard recording conventions for all museum data banks to facilitate the exchange of information.

His committee will also serve as a central office where potential users can obtain information on setting up their own systems.

The ultimate goal is the establishment of a nationwide network for the exchange of museum data, he added.



J.M. McQuillan

CW Photos by Ronald A. Frank
William A. Wulf

cessing structures and how to implement them, researchers believe these systems will become increasingly important as resource sharing networks become available to commercial users.

One of the critical operating points in multiprocessor systems occurs at the processor-memory interconnection (switch) point, Wulf said.

Peter Freeman from the University of California described a system with 16 memory modules interconnected to 16 processor ports using a 74-bit cross-point switch. The system analyzes artificial intelligence and uses PDP-10s.

Expensive Toys

"These networks can be very expensive toys for researchers, but they will also have to be cost-effective tools for commercial users," Ed K. Bowdon Sr., University of Illinois, cautioned the session participants.

"Every installation manager who offers contract or demand services" should be able to transfer his jobs to another processor when his CPU breaks down, Bowdon said. "This is where network computers enter the picture," he suggested.

The user "could not care less" whose resources he is using as long as he gets the best possible service at the lowest possible

price, he added.

In a discussion of the largest resource sharing system yet in operation — the Advanced Research Projects Agency (Arpa) network — J.M. McQuillan of Bolt, Beranek and Newman Inc. said under "heavy loads" throughput on the Arpa network was "degraded significantly."

When Arpa messages arrive at a destination Interface Message Processor (Imp), faster than they can be sent to the host CPU, "reassembly congestion" occurs, McQuillan said. This in turn leads to "reassembly lockup" in which the destination IMP is "incapable of passing any traffic to its hosts," he added.

With 10 or more links in use on the Arpa net with multipacket messages, "reassembly lockup occurs almost immediately," McQuillan said. The addition of buffer storage at both the source and destination has helped to ease the reassembly congestion, he explained.

Optimum tape subsystems for 360 and 370



The TM-34 Tape Drive

All the advantages of IBM 3420 drives, including speeds to 200 ips, radial interface, automatic threading with or without reel-surround cartridges, and single capstan drive. Half the number of components of competitive drives for greater reliability. Modular design for easier, faster maintenance. In brief, the ultimate in tape drives for 360 and 370 computers.

What else could Ampex add to this complete tape subsystem? That the TM-34/TC-38 costs less to acquire and to operate than IBM subsystems? It certainly does!

Call your Ampex computer specialist for details about tape subsystems, disk drives and core memories.

Totally Compatible Flexibility

When the name Ampex is on a tape subsystem, you know you'll get Ampex reliability plus optimum performance and flexibility. The Ampex TM-34/TC-38 is typical. It is totally compatible with IBM 360 and 370 systems, with the TC-38 replacing 2803 and 3803 controllers, and the TM-34 replacing 3420, 2420 and 2401 tape drives.

The TC-38 Controller

Superior error-correction capability to significantly reduce re-runs. Compatibility with future changes in IBM OS through controller microprogram updating without hardware changes. Random-access semiconductor, read-write memory provides microprogram storage and extensive diagnostics. Integral cassette tape drive automatically loads microprogram into memory. Many more sophisticated details that result in optimum performance.

AMPEX

AMPEX COMPUTER PRODUCTS DIVISION
13031 West Jefferson Boulevard
Marina del Rey, CA 90291 (213) 821-8933

IBM 370's

installed or on order.

Talk with CSA, a computer leasing company prepared to show you the way to greater prime and extra shift savings, all with the extra advantage of investment tax credit directly or in the form of a lower rate.

For further information, please call: (617) 482-4671

Computer Systems of America, Inc.

a computer equipment leasing company
79 Milk Street Boston, Mass. 02109

Send for the 12 questions you should ask of any leasing company before you lease.

Name _____

Title _____

Company _____

Address _____

City _____

State _____ Zip _____

370 on order ☐ installed ☐

Model _____ Date _____

Canadian Cities Study

Computer Can Protect Privacy More Than Jeopardize It

By Edward J. Bride
Of the CW Staff

ANAHEIM — Computers, properly used, provide more opportunity to protect privacy than to jeopardize it, Prof. John M. Carroll of the University of Western Ontario concluded from a Canadian study of institutions keeping data banks.

"I don't link computers with the invasion of privacy at all," he told an FJCC evening session on security. Carroll said that complaints on the accuracy or accessibility of personal data were not affected by the fact that some files were manual and others automated.

In fact, in the process of computerizing files, many serious errors were discovered in the manual version, he noted. The study was conducted last year under the authorization of the Canadian Departments of Justice and Communications.

England's Younger Commission, the U.S. National Academy of Sciences (Westin) report and the Canadian task force all came up with similar results: "Most people don't give a damn" about the possibility of privacy invasion, Carroll stated.

The FJCC session last week was attended by about 250 people, but by the end of 2-1/2 hours fewer than 50 were left. Attendees suggested the session failed to give answers to the security problem, but session chairman Rein Turn noted that answers were not promised in advance publicity.

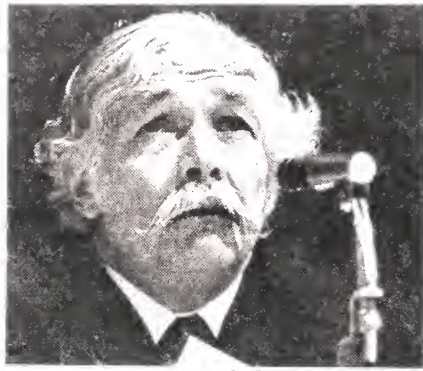
Commissions Failed

The three study commissions failed, however, by not investigating secret files of police agencies, Carroll agreed.

While some of the results of that study have a sameness, there are other facts that are not so well known and that are of great concern to Carroll, he indicated.

Most large Canadian firms exchange data with their U.S. counterparts (where such counterparts exist), and one-fourth of the Canadian firms will have files and DP operations actually located in the U.S. within the foreseeable future, he said.

The reason for this is that there is accruing a "surplus of DP capacity" in the U.S., and Canadians will probably take advantage of this. "Cybernetic imperialism, you might call it," he said, stressing that the predicted combination



John M. Carroll
CW Photo by Edward J. Bride

of efforts presents a "serious future problem."

Since computer capability tends to be underutilized, he continued, the growth in data banks will be one of depth, rather than breadth. This presents still another problem to the protection of privacy, since more can be ascertained about individuals, rather than gathering a little data on many people, he noted.

Computer manufacturers should pay at-

tention to the need for a secure operating system, safe from tampering and from unauthorized accesses, consultant Stanley Rothman told the session.

Rothman said there are indications that users will bind together on a Federal Government level, and write procurement specifications that dictate the security of computer systems.

Rothman also said that in every case of states exchanging data files on individuals, uniform state laws should govern these exchanges. Uniformity will be difficult to achieve, he noted, but it is necessary if data is to be exchanged between states.

Chairman Turn, speaking on the security problem, said only that the selection and implementation of appropriate safeguards are "difficult and poorly understood processes."

As a beginning, Turn suggested users must appraise the value of their data to their own company or agency, and then try to discern how much the data might be worth to an intruder. After assessing the cost of protection, users would then

be able to have a starting point to achieve security.

Turn, a data security specialist with the Rand Corp., said that criminals have been able to access and remove files from both manual and computerized systems.

Such unauthorized access could take place in business, too, and "what is needed is data security engineering" to prevent these problems, Turn said.

In general, government is willing to spend large amounts of money on physical security; businesses can assess the value of proprietary data, but "personal data is subjective" and difficult to evaluate.

The circumstances of the individual and the possible market for data all make it difficult to put a price on this data, he explained. Also, it is difficult to measure a system's susceptibility to subversion by people, rather than by technology.

Few questions were posed to the panel regarding ethics, politics or the technical ability to invade privacy through data banks, although the audience and the panel were familiar with the many studies undertaken in the past year on this issue.

Full System Depends on Good Balance

By Marvin Smalheiser

CW Correspondent

ANAHEIM — The key to creating a full computer system for manufacturing is setting up good balances, Richard Lilly told an all-day FJCC seminar on DP in manufacturing.

Lilly, president of Manufacturing Management Sciences Inc., Burlington, Mass., said manufacturing systems fail because they are not full systems.

A major sin producing the imbalance is the lack of effective documentation.

There must be sufficient information at all levels from the floor person to management and it must be enough for upper management to establish inventory policies and examine alternatives.

Also, operating management must have sufficient documentation to understand the principles and theories involved. Operating personnel must be able to understand reports, exceptions and actions on a day-to-day basis.

Lack of continuing management con-

trols, Lilly said, prevents management from establishing effective measurement of performance, a cause for "one of the main reasons for failure of an inventory system."

The inventory management system control record, Lilly said, is the most vital management report in the system because at a glance the inventory manager can quickly determine any fluctuations, trends or out-of-balance conditions.

Another fatal sin, he said, is the inability to trace updated transactions.

"A major complaint of inventory control personnel is that once a transaction updates an item's status, either the time required to trace the transaction is prohibitive, or the transaction disappears completely," Lilly noted.

"Thus, when the inventory record and physical counts are not identical and there is no audit trail information to show the reason, the system's credibility decreases at each occurrence until at some point the user simply bypasses the system

by setting up his own manual subsystem.

"To correct this, the user must be given the ability to trace at least 30 days of transactions through inquiry. In other words, an audit trail of all processed transactions must be chained to each item."

Regarding the inability to trace rejected transactions, Lilly said, the problem results because there is no positive control of transactions once they have been rejected.

"Any rejection should at least suggest a correction, yet no formal procedure for error correction exists. There must be some positive proof that the correction has been made."

Lilly also cited lack of adjustment date filters and "ignoring the presence of lumpy demand."

"One of the main benefits to be gained by computerization of inventory," he said, "is the measurement of the error in the forecast and its use in establishing safety stock to meet a required level of customer service."

"Most often overlooked, however, is the fact that a number of items do not have a demand which is predictable, due to its lumpy character."

"The user must decide whether he can justify carrying a higher level of inventory to accommodate the high demand (peak) that occurs infrequently."

'Getting Most out of Nuts and Bolts'

Special to Computerworld

ANAHEIM — Manufacturing firms which want to use the computer to its best advantage should treat it as a low value item like a nut or a bolt.

Oliver Wight, a consultant, also told an FJCC seminar: "You need it (the computer) to put your product together, but the more standard it is the better you are."

"People make the system work, the system doesn't do anything. It just generates information," Wight told an audience of about 200 persons at the Disneyland Hotel convention center.

"The computer is a way to enhance people so they can do a better job," he said, but cautioned against making the computer system too automatic so the people working with it will have control over it.

"The worst recommendation for a system generally is that it works in another division," Wight said, and he commented that such a system is hardly ever transferable unless the people using it are also transferred.

Manufacturing with the aid of computers, Wight stressed, is an elusive area "but a very, very big payoff area."

Wight said, however, there is "nothing profound" to making computer systems work in manufacturing and detailed what he called "secrets" of making them work.

The first, he said, is recognizing the

difference between a formal system and an informal system.

"The limitations of the annual system used in manufacturing plants has made it impossible for a formal system to work,"

Wight added, and attributed the failure of many computer systems to the inability of processors to recognize that there was an informal, manual system being used.

It is not the same as mechanizing clerical work, Wight said, and added that many analysts have made the mistake of automating the formal system when it was the informal system that really functioned.

"Priority planning is the guts of production control and you have to control capacities and priorities," he indicated.

Material Requirements Planning, he said, is necessary for production control of any product with dependent materials.

Wight also said that both involvement and education are necessary for inventory and production control.

"Involvement means accepting the responsibility for the success of the system."

"You have to educate the user right from the beginning, not after the system is designed."

Wight also warned against frivolous sophistication.

"People on the floor abhor sophistication. The simpler your system the better. Sophistication doesn't work today. Today we are having an orgy of sophistication and nothing kills a system faster," he

noted.

Give the people control over the computer, he said. "Don't let the computer run the people."

MRP a Boon to Inventory Control

Special to Computerworld

ANAHEIM — Material Requirements Planning (MRP) as an inventory and production control tool for manufacturers using computers came under close scrutiny at one FJCC seminar.

Robert Galante, vice-president, Manufacturing Management Sciences Inc., Burlington, Mass., explained how to set up an MRP program and master schedule and told his audience at the Disneyland Hotel to be realistic about what such a system can perform.

"If the system is not set up effectively, the informal system that existed before will come back."

He warned the user against trying to put more into the system than he wants it to put out.

To counter resistance to an MRP system, he said, it is necessary to go directly to the general manager. And he added the system must be built as a bridge between manufacturing and sales.

Once the system is under control, he said, the result is that there are not as many fires "with everybody fighting everything and anything because they never know what will come up."

The net change system for requirement planning, Galante said, is really the long-term solution because it allows the user to change all items when any one item in a plan changes. "It is current all the time."

He suggested that frequent or even daily replanning could be feasible, depending on the company and its products.

The trouble with statistically tested parachutes should be obvious.

We think the same thing holds true when it comes to computer tape.

We make Epoch 4. And we've just never been able to bring ourselves to test it statistically.



A lot of manufacturers don't feel that way.

Maybe it's because they're not willing to admit that every now and then a speck of something just might get through the clean room and onto your tape.

And there's always the possibility that a coating hole might get through.

That's why every reel of Epoch 4 is 100% certified.

And that's one of many reasons why Epoch 4 is the finest tape buy on the market today.

Mistakes happen.

The difference is, Graham Magnetix doesn't sell them.



 **GRAHAM
MAGNETIX**

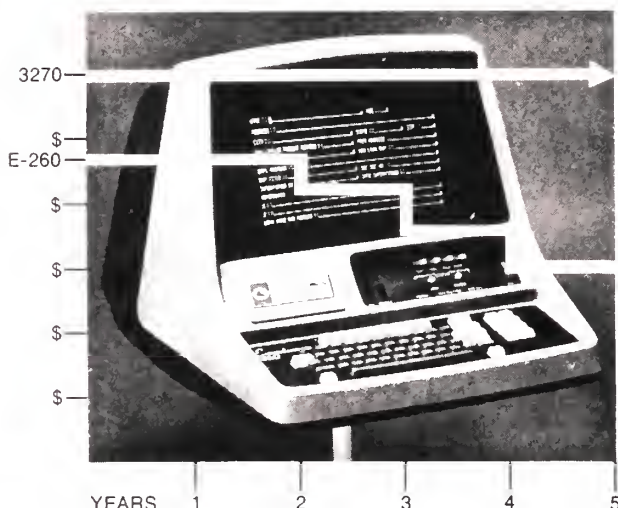
GRAHAM, TEXAS 76046



CW panorama by V.J. Farmer and H. Fling

If you rent terminals on a monthly basis you're losing money.

There is an alternative.



Your terminal applications and systems have a useful life measured in years rather than months. So why rent terminals on a costly, month-to-month basis?

Courier's new extended lease plans can save you from 15 to 30% of the 3270 rental. Plus guaranteed renewal prices with even greater savings in years 3, 4, 5, etc.

There's no discount of Courier quality features. Such as insert/delete. Protected format mode. Fully-buffered terminals. Full-function keyboard. Remote or local. Or dial-up. Choice of 480, 960, or 1920 screen sizes. Fastest response time.

And Courier Executerm terminals are plug compatible with 2260 and 2265. No costly software changes.

It's a matter of good business sense. You save money, and you know what your costs are going to be in the years ahead.

And isn't it nice to know you have a choice.

Los Angeles (213) 641-6495 San Francisco (415) 989-6580 Dallas (214) 651-8555 Kansas City, Mo. (816) 561-8785 Chicago (312) 696-4360 Detroit (313) 357-2330 Cleveland (216) 734-4840 Columbus (614) 457-5107 Pittsburgh (412) 931-4116 Philadelphia (609) 795-3348 Washington, D.C. (202) 223-9400 Atlanta (404) 284-2361 New York, N.Y. (212) 758-4955 Boston (617) 890-0020 Houston (713) 225-9561 Phoenix (602) 258-7271 Denver (303) 399-6990 Cincinnati (513) 984-1555 Minneapolis (612) 835-6999



Consider the alternative:

Courier
Terminal Systems, Inc.

A SUBSIDIARY OF BOOTH COMPUTER CORPORATION

2202 E. University Drive, Phoenix, Arizona 85034

Most Users Happy With FJCC Format

(Continued from Page 1)

gram, the reaction covered the extremes. For example, the six sessions that effectively constituted a "mini conference" on measurement of computer systems received an enthusiastic reception from attendees. In fact, so many wanted to attend these meetings that standing room only was the watchword as the sessions spilled over into the hallways.

Several users commented on exploring one idea in depth, such as the measurement session and most seemed to welcome the idea.

"We're just getting into this area," one said, "and in a day and a half I can get all the basic information I need for future planning. It's a great idea."

There was some criticism, however, of the more technical sessions, with several users and industry people indicating that some of the meetings were too narrow in scope to be of much interest to anyone except the small circle of other experts in the field.

"I come here for an education," one source said, "but most of these technical meetings I have been to have been so technical and detailed, I couldn't really understand them. It seems to be one small group of technical experts talking to each other in many cases," he added.

Exhibitors generally liked the show, and many said it was about time to sing "happy days are here again."

While the upturn in attendance and in attendees' attitudes on buying was seen as a positive sign, Afips was even more optimistic about next year's National Computer Conference and Exhibition. Officials predicted 30,000-50,000 would attend that conference, the first of the annual meetings.

The move to Anaheim, from what was becoming a traditional FJCC site in Las Vegas, was done to bring the conferences closer to users and to computer designers, Afips said.

The exhibits, though, closed at 6 P.M., leaving little time for some users to view what was heralded in Afips publicity as the latest in computer products.

Afips explained that the exhibitors felt "the people they really wanted to see" would be able to get time off during the day. The exhibitors were also concerned about the ability to staff their booths during evening hours, Afips reported.

Site planning for the new national conferences will be on a three-year cycle, going from the East to the Midwest and then West Coast, Afips related. Thus, New York will be followed by Chicago for the 1974 show.

A site for 1975 has apparently not been chosen, but Afips said that Anaheim remains a good candidate for future conferences because of its location in the heart of the West Coast computer industry.



FJCC Panorama of the Exhibit Floor



Puppets marched to the recorded sales pitch of Ampex cooking Chef P. Ripherals and "Sylvia," cooking up a mixed system.

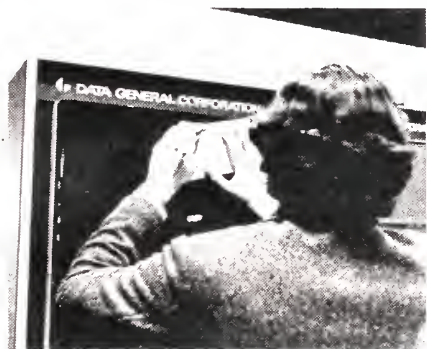


Sometimes the plotters gave the pinups too much of the wrong thing.



General Automation raffled off this new Subaru automobile to demonstrate its SPC-16 mini's prowess at checking auto-electrical systems.

A Look at the Last FJCC



One writing table is as good as another.



Keep smiling
Photos by V.J. Farmer



ACM's booth was to the point.



Three days later . . .



Kodak presented its KOM Microfilmers.



Vortrax sent its audio-response system from Rixon/Sangamo uses card tricks to gather a crowd. outer space.



Use of Measurement Tools 'Responsibility of Management'

By Don Leavitt
Of the CW Staff

ANAHEIM — The use of any techniques to measure or improve the reliability of software is a management responsibility. No matter how good a technique may be, it won't do any good if management doesn't know how it should be used and doesn't require its careful implementation. Commander Grace Hopper told the FJCC session on Measurement of Computer Systems: Software Performance.

Even the increasingly popular concept of developing proofs of correctness of programs is no assurance that the software is completely good, she said, noting such proofs generally confirm only that good input produces good results. The proofs do not explicitly require that the programs being analyzed trap all invalid input data, and that is a major omission, she said.

Robert Gordon, a DP consultant, was critical of the performance techniques for a different reason. He said the DP community had to put "first things first" and define where it is going, "so that we'll know when we've gotten there."

Specifically, he challenged several of the authors who had preceded him on the panel to provide a detailed definition of

what they meant by "reliability" of a software product. Is this simply a measure of the program working correctly for a given period of time? Or can a program, operating correctly, but carrying a large segment of unexecutable code, also be considered reliable, even though the unused code has never been tested? he asked.

Commander Hopper noted that there had been absolutely no reference in the preceding discussion about the need for standards so that software, like many

Measurement: Hardware or Software?

other American products, could reasonably be built from interchangeable parts. Without such standards, every piece of software has to be hand crafted and, in effect, hand-tested to know what it will do, she said.

Gordon also raised questions about non-programming systems that were intended to improve communication between the user, the analyst and the programmer. In particular he asked Alan Merten of the University of Michigan to explain how a



CW Photo by Edward J. Bride

Panelists Robert Gordon and Cmdr. Grace Hopper lead session on Software Performance.

user who had no knowledge of the capabilities of a computer or its peripherals could be expected to use Problem Statement Language (PSL) effectively.

PSL, Merten had said earlier, is a free form language that allows the non-DP-oriented user to describe what data he has available and basically what he wants to do with it. It is intended to support the validity of the request, the correctness of the programmed solution and the effectiveness of the solution as it is performed.

By design it is data-oriented, he noted, and is not concerned with what device the programmer chooses as an output media, for example. This was specifically the problem Gordon was concerned about: with PSL, the ultimate user might not even be aware of the possibility of graphic display which might be far more effective than the tabular printout the programmer chose to generate.

Currently PSL has an analyzer which reviews the completeness and consistency of data being proposed for a programming project, but it does not review any logic plans. It could conceivably be used to generate code but this would probably be limited to the Data Division of a Cobol program, Merten said.

Prof. Norman Schneiderwind of the Naval Postgraduate School was under heavy fire during much of the session for his attempts to classify the reliability of a software program. In his view this could legitimately be a mathematical expression of the probability of occurrence of a given type of error in a given amount of time.

This type of reliability could be estimated by the program developer based on experience with the software prior to its general release. With the ability to define the reliability of a given program, the developer could also get better control over test costs, and a better understanding of the characteristics of a program that affect reliability, Schneiderwind said.

Reliability in Gordon's view was more closely related to assurance of continuous correct functioning of a program, somewhat akin to what others have called certification. The concept that a program is 95% sure of running correctly for six months, or a year, left others in addition to Gordon unsatisfied. One user noted that concept is like weather reports that predict 95% chance of good weather. It's great unless you get caught out in the 5% rain. Then you're soaked, he said.



NATIONAL MARKETING EXPANSION

The world's largest producer of Intelligent Computer Terminals is planning a major expansion in January of 1973.

The tremendous acceptance that the Model 340 is receiving plus a broadening of the Sycor product line have created a number of excellent professional openings across the United States:

CHICAGO

ST. LOUIS
INDIANAPOLIS
MINNEAPOLIS
COLUMBUS
ATLANTA
WASHINGTON, D.C.
SAN FRANCISCO
NEW YORK CITY
ANN ARBOR (HEADQRTS)

Midwest Regional Manager
Systems Engineer
Sales Representative
Sales Representative
Sales Representative
Sales Representative
Sales Representative
Systems Engineer
Sales Representative
Systems Engineer
Product Manager
Product Specialist
Systems Engineer
Manager, Training & Documentation

(With the exception of the headquarters positions, we prefer to appoint current residents of the cities.)

Midwest Regional Manager

Requires a record of personal sales success in EDP hardware and the demonstrated ability to recruit, train and motivate professional salesmen. Will be responsible for Chicago, Minneapolis, St. Louis, Cleveland, Columbus, Indianapolis, Dallas and Houston.

Sales Representative

Requires minimum of 3 years experience in selling EDP hardware and a record of quota achievement.

Systems Engineer

Will provide technical support to the sales RXXforce. Should have strong background in programming/systems analysis. Hardware experience in communications equipment would be desirable.

Product Marketing Manager

Will work with product specialists and customers in development of applications. Will be responsible for Model 340 product support and future enhancements. Will participate in product planning and will be responsible for competitive analysis. Related experience with manufacturer of DP hardware is required.

Product Specialist

Graduate engineer desirable but not mandatory. Should have had considerable exposure to electronic hardware design and development. Should have familiarity with electronic manufacturing. Will be responsible for technical support of products sold to OEM customers.

Manager — Training & Documentation

Minimum of 3 years experience in EDP related RXX training and documentation with a background in programming. Will organize and supervise customer training programs. Will write, edit and supervise production of operators, programmers, and reference manuals for Model 340 and future products.

Please Submit Resume and Salary History To:
Mr. C.J. Corona, Dir. Ind. Relations

SYCOR, INC.

100 Phoenix Drive
Ann Arbor, Michigan 48104
An Equal Opportunity Employer

**To make sure you're paying
as little as possible for tape,
disc or core storage, make a
collect call to Jack Flynn at
(617) 266-4950.**

It'll get you the lowest rental charge in the business.

As low as one-third of what you're paying IBM for a 2311, 2841, or 2401, Models 2 and 3, Models 40 and 50 Core Storage.

And Jack'll get it all for you from one source.

From us.

Bankers Leasing Corporation, as the marketing and administrative representative for Diebold Computer Leasing Inc.

The people who can lease you the tape, disc or core storage you need for less.

Or lease you an IBM 360, Model 30, 40, 50 or 65 in any configuration you need.

Wherever you need it.

With IBM continuing to maintain it after it's installed.

One collect call to our Jack Flynn will tell you exactly what we can save you on exactly what you need.

Bankers Leasing Corporation

1255 Boylston Street, Boston, Mass. 02215

The Question Is:

What System Parameters Should Be Measured?

By E. Drake Lundell Jr.
Of the CW Staff

ANAHEIM — The largest problem facing developers of measurement systems to analyze system performance is that no one knows exactly what to measure, attendees at a session on "Measurement of Computer Systems — System Performance" agreed.

Everyone has his own ideas of exactly what should be measured to gain a handle on the effectiveness of a complete computer system, Kenneth Kolence, a software engineering consultant, indicated.

And until the practitioners in the field can agree on the parameters that are necessary for effective measurement, the field will be held back, he said.

Today the use of computer performance analysis ranges from feasibility studies through post-implementation hardware augmentation, according to Seymour Jeffrey, Chief of the Systems Development Division at the Institute for Computer Sciences and Technology of the National Bureau of Standards.

Presently the techniques are used basi-

cally, he said, to maximize throughput, decrease turnaround time, identify levels of utilization, modify device allocation and determine modification requirements.

The presently available tools to perform these functions include hardware monitors, software monitors, simulation (discrete event and simulator packages) accounting systems and benchmarks, he noted.

Of these, he indicated, hardware monitors have either no, or just a slight, degradation effect on the system being studied, while software monitors have a low to medium degradation effect.

The level of detail produced by the software monitors, he said, is generally in the medium range, while with hardware devices the level is dependent on the device and covers the entire range from low to high detail in the analysis.

He also noted system overhead for the hardware devices is essentially zero, with only extraction software required.

Software monitors, however, usually required 5K to 10K of core space and 3%

to 10% of the CPU cycle times, he said.

There are no detailed studies of how users are presently using measurement techniques, he indicated, but a recent survey of government computer users with measurement systems indicated software monitors were used in around 23% of the installations, simulation in around 18% and hardware monitors in about 19%.

Measurement: Hardware-Software?

of the cases. Also benchmarks were used by 17% of the users, analysis using accounting routines in about 17% of the shops, and mathematical analysis used in the remainder.

In the commercial world, he noted, a recent survey by Guide indicated 54% of the users were presently using either hardware or software monitors in order to perform hardware tuning and about 59% used the devices to perform some operating system tuning.

While the tools available to the user in

order to perform measurement studies are increasing in sophistication, he said, "unfortunately the user has not always been able to use the sophistication of the tools."

He noted development is underway on hybrid hardware software monitors combined with accounting systems to "provide complete data for performance analysis."

Conversational monitors for real time information based on a user's questions about system performance will also be available, with the on-line program probably residing in a minicomputer.

He also noted one of the problems with hardware monitoring is the difficulty of identifying probe points and making physical connections, but said that a central probe point on mainframes could eliminate this problem.

Another thing that could help users perform analysis work would be the development of CRT displays that allow the analyst to easily visualize the performance measurement and that give instantaneous display of measurement data.

One of the most significant developments in the future, he indicated however, would be development of hardware monitors built into the mainframe by the hardware manufacturers, but some in the past have wondered if the mainframe makers really want users to be able to quickly identify the performance of their systems.

But even with all of these tools, Jeffrey said "the FDP manager should be aware that the tools and techniques themselves do not offer the answer to performance improvement."

"It takes a trained expert in the use of these tools and in the hardware and software that the tools measure to perform the required study. The tools may serve as an aid to understanding, but it is man's ability to properly interpret the measurements taken by the tools which makes for successful performance analysis," Jeffrey concluded.

Users Best Catalyst for New Tools

ANAHEIM — It is surprising that hardware monitoring tools are not more widely used, because a small investment can produce tremendous savings, according to panelists at a session on "Measurement of Computer Systems — Hardware Monitors and Their Applications."

The panelists indicated users must become more active in the design phase for these devices in order to press the manufacturers to supply tools that are more effective and meet the users' needs more efficiently than at the present.

Richard Ruud of Applied Computer Technology said the current tools available to the user are "abysmal," but noted manufacturers often have a hard time getting capital from investment sources to develop such systems because of the impression that users are not interested in monitoring.

User Ultimate Loser

The user is the ultimate loser, he said, when money is not available for development efforts in this area, because there will not be as many tools available in the future as firms drop out of the market.

The greatest need, he said, is for systems that take advantage of the capabilities of minicomputers used at the heart of the monitoring system.

Both hardware and software are "absolutely essential" for the development of effective monitoring tools and neither are fully effective without the other. Because of this, he said, the artificial barriers should be dropped and the two should be joined in future monitoring systems.

Another defect in the presently available systems, he said, is that probes and counters are not fast enough for the super-sophisticated computers on the market. The technology is presently available to develop these faster probes and counters, but no one is taking advantage of it, he indicated.

Ruud challenged users to press manufacturers for more effective measurement and he suggested combined user-manufacturer teams might be best to develop the software needed since the user often has greater software expertise than the manufacturer.

Jerre Noe, a user of the Applied Computer Technology monitor, told the group that future development efforts should be directed toward developing systems that can answer significant user questions and not just monitor the system.

But in the long run, he said, the answer to monitoring is to build them into the mainframe, noting that "if a monitor and

probes can be built into a Volkswagen, they certainly should be built into a computer."

Noe warned other potential monitor users that they should not get started monitoring their systems until they have a well developed plan of where they want to go and what they expect from the effort.

He also backed the contention that the user needs both hardware and software monitoring systems to be effective.

He also stated a user has to constantly make sure he is getting the measurements he needs and noted it is sometimes hard to tell if he is measuring the right thing and that the measurements are accurate.

There is often unused hardware capacity buried in large systems, he stated, that could be used by innovative users for monitoring purposes.

He also warned users about unexpected problems when they begin monitoring and noted that they might uncover unexpected inefficiencies even the designers don't know about.

Henry Cureton, formerly of Boole and Babbage and now with Hewlett-Packard, said users of measurement tools should be the ones to determine and direct future development of these tools.

"Only when users begin to systematically evaluate and design measurement

tools, will measurement become a science," he declared.

What should a user watch for when looking for measurement tools?

Maintenance is an important consideration, Cureton said, since the best tool available is meaningless without proper maintenance. Another factor to be considered is the expandability of the system, he said, and users should make sure that their monitors can meet their future requirements as well as their present needs.

The user should also press for good useable documentation and training and should make sure that the system is compatible with other measurement tools available.

Measurement: Art or Science?

ANAHEIM — Measurement and performance evaluation of computer systems is "an art trying hard to become a science," session chairman Dr. Arnold F. Goodman of McDonnell-Douglas told a session on "Measurement of Computer Systems: Executive Viewpoints."

At the same time, Goodman indicated that most of the efforts in this area at present involve measurement and performance evaluation after the fact — after a system has been designed and built.

He indicated tools are needed to predict how a system would perform before it was built and placed on the market so that inefficiencies could be caught early enough to be designed out before the system is installed.

Two Different Approaches

Presently, he said, there are two different approaches to the development of measurement systems: a theoretical approach and one based strictly on quantities of collected performance data.

In the future, he said, there will be a need for a combination of the two in order to develop effective measurement systems that cannot only measure after the fact events, but that will also have predictive ability.

Robert Johnson of Burroughs Corp. indicated that in the design process, "measurement often comes last and is frequently forgotten" by computer designers, at least forgotten until it is too late.

He said it is amazing that at present "we have a \$10 billion industry and still no one can tell us exactly what our product does."

He said there is a need to come up with

a simple measure to describe various systems performance factors in order to simplify the user's decision process when purchasing new systems or adding to present ones.

In many cases it is hard to adequately describe system performance, he said, because "many of the things that make systems easy to use, do not benchmark well and add to the cost."

"A total and ultimate evaluation of any product is not and cannot be an absolute science," according to Louis Robinson of IBM.

This is because many of the attributes of computer systems are not quantifiable or reducible to set or exact figures, he said.

Many people look at the same product in different ways, he continued, so what is a plus to one user might be a negative feature to another.

A recent study for the General Accounting Office indicated that a true measure of productivity "should take into account both efficiency and effectiveness, with efficiency relating to the cost of producing output and effectiveness to the value of the output," according to Edward J. Mahoney, deputy director of financial and general management studies for the government agency.

In order to help perform studies of effective systems, Mahoney called on all computer users to contact the General Accounting Office with "outstanding examples of highly productive DP operations and why they are productive," and promised that the government would share information it develops in this area with users.



What Are Options?

Optimizing OS? Evaluate First

By Don Leavitt
Of the CW Staff

ANAHEIM The functioning of a given operating system often can be optimized by knowledgeable users, but the direction optimization should take depends on the individual innovator's evaluation of the options open to him. The trade-offs have to be considered, according to T.J. Teorey of the University of Wisconsin.

Speaking to the FJCC technical session on operating systems, Teorey outlined, as an example or possible trade-offs, what users should consider before implementing a disk-scheduling system.

His think-about-it-first approach was echoed by James C. Browne of the University of Texas who described the possible interactions of multiprogramming job scheduling and CPU scheduling.

Later in the same session, Daniel L. Murphy of Digital Equipment Corp. described the philosophy of the Tenex virtual memory operating system for the Decsystem-10 and Karl N. Levitt spelled out some of the work being done in proving the "correctness" of programs at Stanford Research Institute.

Teorey noted some users contend there is only one disk scheduling policy, while others see the possibility of selecting the most appropriate from the several scheduling schemes available.

On the other hand, he suggested, it is entirely possible that factors having nothing to do with the disk itself may make it completely useless to install any sort of scheduler to optimize the disk accesses.

Users must consider the effect of scheduling in terms of the performance of the single disk device, the disk subsystem (if there are more than one disk) and the total multiprogramming system. To understand the trade-offs, Teorey's group de-

veloped a set of meaningful models of possible disk schedulers.

'First Come...'

These models allowed him to study the throughput, mean response time and variance in mean response time made possible with the different possible schedule schemes. He noted these schemes included a first-come/first-served approach, one in which the shortest seek time was handled first, and three variations of scanning for seeks.

The effectiveness of the schedulers was influenced, he found, by the level of multiprogramming and of multitasking, by the pattern of the load imposed on the channels and controller as well as the disk itself, and by the presence or absence of rotational position sensing.

There are several conditions in which seek time is not, and cannot be the dominant consideration, he added, citing multiple track records, sequential processing and write-and-verify situations as examples. In these cases, seek time optimization is a worthless goal and might just as well be forgotten.

The choice of job scheduler and CPU scheduler must also depend on the desired goal of

the system, Browne told the overflow audience at the morning session. There are four separate approaches to both these scheduling operations and the combination used can have an impressive effect on the system.

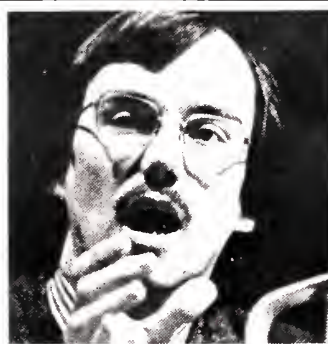
Working on a CDC 6600, he built models of the possible schedulers, including — for both job handling and CPU utilization — the "non-scheduling" first-come-first-served approach.

Other techniques included "shortest time to run first," "smallest cost first," and "smallest memory first," for job scheduling, a round-robin, smallest time remaining first, "shortest burst time next" or "longest burst time next" techniques were considered as bases for CPU scheduling, he said.

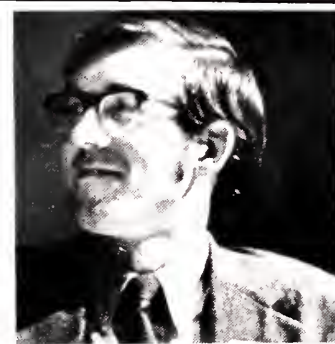
Throughput Rates

There is an enormous difference in the throughput rates produced by the different job-scheduling algorithms, Browne found. Two methods, the shortest time first and smallest cost first, give "strikingly better performance" than the other approaches, he said. Throughput is more sensitive to the differences in schedulers than is CPU utilization, he added.

In building the Tenex system



CW Photos by V.J. Farmer
Daniel L. Murphy



T.J. Teorey

for the Decsystem-10, Bolt, Beranek and Newman Inc. had three goals, DEC's Murphy told the session. The system was intended to simultaneously support (1) on-line edits, assemblies, compiles and executions of the resulting object code; (2) very large jobs that wouldn't fit in available real core; and (3) very small highly interactive jobs.

To do this, BBN built a paging hardware modification for the KA10 model of the DEC mainframe. As a result, the system now provides a 256K-word virtual memory for each process, and backing for a multiprocess job structure with software interrupts. A general and powerful file system is provided along with what Murphy called a "human-engineered" command language.

Program pages, under Tenex, are 512 words long, he added, then noted this page size was used just because "it didn't seem too big, and it didn't seem too

small." The system allows the use of non-contiguous slots in real core and supports the use of data and programs from various sources.

Described as "not quite as powerful as Multics," Tenex makes good use of real core, Murphy explained, by continuing DEC's standard approach of reentrant code for the basic programs used by all, and "private data" exclusive to each user. Tenex carries the concept further, however, in supporting the use of private libraries as well, he said.

Tenex utilizes a system of Job File Names, made up of a file identifier and a page number, to pinpoint the specific page each user process is accessing. This allows several processes to access the same page, if the need arises, concurrently without conflict. The techniques also enable a single user to access several pages concurrently or sequentially, he added.

Software Complexity the Limiting Factor

By Don Leavitt
Of the CW Staff

ANAHEIM — Complexity of software is the "third dimension" in studying how systems work and, compared to the first two dimensions — storage control and throughput — complexity is the limiting factor. "It has reached the point where users find it easier to understand how a computer works, than how an operating system works," Dr. Harlen Mills of IBM's Federal Systems Division reminded one of the FJCC sessions on software

engineering.

Earlier, Clark Weissman of System Development Corp. told another session on the same subject that software costs were no longer acceptable, particularly in the light of cost/performance reductions in hardware. But, he added, several users have been developing tools and techniques, and methods and theorems to attack the problem.

Part of the problem according to Dr. Fred Haney of Xerox, is that even if modular programming techniques are used, and used well, changes are needed, and a change in one module can be expected to trigger a chain reaction in other modules throughout the program or system.

The reaction may carry across modules on several levels of relationships, he noted, so even strong efforts to isolate modules from one another in that way may not be effective.

Nevertheless, the modular connection analysis (MCA) approach can be used to estimate the cross-module effect of a change, either after the need for a change has been revealed by a program failure, or before a desired change is made to "enhance" a system.

With MCA, he said, a system is recognized as hierarchical in structure, perhaps consisting of subsystems, components and modules, with some interdependence possible between parts of the system at any level.

Relatively simple matrices can identify the number of possible impacts a change can have on the system, including perhaps ricochet effects on the module which started when it was first changed.

MCA differs from earlier techniques with similar goals in that

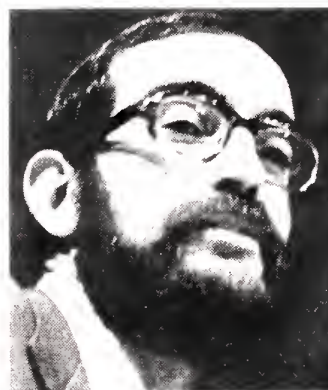
it considers just the internal system structure and not its environment. It uses a simple algebraic formula and can be applied regardless of the type of change being made or contemplated. In any case, he said, it has succeeded when applied to work Xerox has done to maintain its Universal Timesharing System and it is clearly better than intuition.

James Brown of TRW Systems Group attacked the problem of software development from a different angle, describing how his company developed an automated testing technique. It seems to go a good bit of the way toward solving the usual problems:

- How much testing is enough?
- What can be done about the high cost of testing?
- How can the results be made more visible?

How Systems Work

- What can be done to improve the confidence in the final product, for both the user and the supplier?



James Brown

The Product Assurance Confidence Evaluation (Pace) program imposes a management control and level of objectivity on the testing process that TRW just didn't have before, Brown said.

The technique makes the user approach his problem and solve from the start point and not go to a new step until he has solved the previous one. In effect, it directs the programmer toward "top down" or structured programming.

One of the elements of the Pace system, Brown said, is a Fortran source code checkout system called Flow. Even without executing the target program, Flow can report many things about how it would run, he said. Flow's ability to identify those parts of the target program that would never have been accessed or executed is perhaps its greatest advantage, he added.

Other printed output from Flow includes timing studies to support code optimization efforts, and several trace routines. One trace display aids debugging, while another option identifies and thereby clarifies program logic.

By printing test results, Flow quantifies test efficiencies, and cuts long-range test costs. It shows programmer and user both what happened in the test and ultimately increases the confidence of both in the reliability of the software when it is delivered.

Although Flow or the other elements of the Pace system don't directly determine how much testing is enough, they do provide a teaching function (as a byproduct) so users can realize when further effort is justifiable and when it is not worthwhile in terms of improvement that can be expected.

Replace Your KEYPUNCH with a 5¢ PENCIL

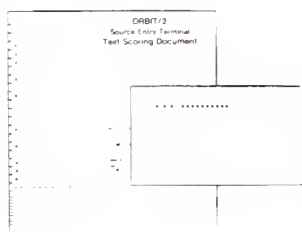


New low cost, source data entry terminal, ORBIT/2, eliminates transcription, keypunching and costly delays. Lets you enter original data directly at the source from the original source document.

ORBIT/2, selling in quantity for less than \$2000, is a hand-fed optical mark reader designed for economical capture of marked sheets or cards at remote locations.

Make your mark. Solve your data entry problem... order your ORBIT/2 now!

- Reads sheets and cards
- Reads pencil marks, holes and block hand print
- EIA RS 232C interface
- Less than \$2000. (in quantity)



OSI

ORBITAL SYSTEMS, INC.

Church & Fellowship Rds., Moorestown, N. J. 08057
(609) 234-1700 Telex: 83-1429

For the Inexperienced User

Debugging Tools, 'Natural' Input Ease Programming

By Don Leavitt
Of the CW Staff

ANAHEIM — Much work has been done to make the power of the computer accessible to the inexperienced programmer and to the non-DP professional, and efforts in this direction are continuing at an increasing rate, according to Prof. Howard Morgan of the University of Pennsylvania.

Chairing an FJCC session on Human Engineering of Programming Systems, Morgan noted that some of these systems have been built to support the user's natural language input; others have eased the debugging of programs written in "conventional" programming languages.

Thomas Williams of System Development Corp. described an experimental, interactive graphics system called The Assistant Mathematician (TAM). The TAM user works on a data tablet as an I/O device, entering data and operations to be performed using handwritten symbols. The system responds

through a CRT unit whose screen is rear-projected onto the data tablet, Williams said.

The system has a basic repertoire of 120 symbols, but each user defines the way in which he writes these symbols so there are virtually no restraints in the input form, as long as the particular user is known to the system. TAM is able to perform most mathematical operations working from the same notation the user would utilize if he were solving the problem with paper and pencil.

Developed jointly by the National Aeronautics and Space Administration (Nasa), Advanced Research Projects Agency and SDC, TAM effectively isolates the user from programming in the usual sense. Even common mathematical constants such as Pi are built-in, Williams noted.

The system includes editing capability and prompting of the user when an unrecognized symbol is entered, but some

problems still exist, he added. Perhaps the biggest of these problems is the "normal ambiguity of mathematical notation," he said, admitting the problem of how to interpret parentheses had not yet been solved.

TAM's method of "protecting" the user from the computer contrasts with the debugging routines for PL/I that have been implemented on the MIT/Honeywell-developed Multics virtual memory time-sharing system. These allow the user to work actively with the language itself to develop his program.

Multics is written in PL/I. Barry Wolman of Honeywell Information Systems told the session. This means the debugging tools for user-level PL/I programming are better than they are for some of the languages less critical to Multics. And virtual memory is directly useable by the PL/I user, since the virtual address corresponds to the PL/I pointer value, he noted.

Debugging support includes a

run-time symbol table, a map of the object program and, after execution, a profile table, showing how many times each source statement was executed.

The Multics PL/I debugging package also provides the user with control "hooks" throughout his program. These hooks can be used any way the user wishes — to set up breakpoint controls or take execution counts, for example — with the definition of how they are to be used determined at run-time. Thus two consecutive tests could provide different debugging sup-

port, he noted.

Carole Dmytryshak, vice-president of Bankers Trust Co., described a Fortran-based Investment Analysis Language (IAL) which falls somewhere between Multics' PL/I support and TAM in the way it isolates the user from the programming language. IAL allows the user to access predefined Fortran subroutines by function names that are significant to the user.

Most of the users have a familiarity with Fortran, she admitted, and this makes the use of IAL easier.

NAS's Oettinger Says

Public Best Served By Intergroup Study

By a CW Staff Writer

ANAHEIM — "How information technologies are best to serve all Americans is a matter of vital public concern" that should be discussed by interdisciplinary groups made up of industry figures, scientists and others, according to Anthony Oettinger, chairman of the Computer Science and Engineering Board of the National Academy of Sciences.

Oettinger, the luncheon speaker at the Fall Joint Computer Conference, noted many of these broad issues had been handled by the board in the past, but the board was now being phased out due to a lack of funds, leaving a great deal of unfinished work.

Issues Studied

Issues that have been taken up on an interdisciplinary basis include studies of the state of U.S. technology in relation to the rest of the world, the problems of interconnecting computer equipment with the communications system, and an exploration of the current and future status of information technology in library systems.

One project under study since the board was founded, Oettinger noted, involves the issue of privacy of records stored in computerized data bank systems.

Interdisciplinary Approach

The interdisciplinary approach to all problems was the key to the board's success, he indicated.

"Above all, it was necessary to overcome that traditional propensity of the scientific and technological community to mutter into its own beard or whisper into its patrons' ears, in favor of addressing the general public in a loud clear tone," he stated.

"Only through the closest cooperation among experts of the most varied kinds and between these experts and the ablest generalists available in the nation

can we begin to discern the whole range of technical alternatives that deserve consideration in important national policy issues," Oettinger opined.

Funds Expired

And while admitting it was not perfect, he claimed the Computer Science and Engineering Board "has the merit of being an approximation to the ideal."

However, he said, "the money has run out. On July 6, 1972, the National Academy of Sciences asked the Computer Science and Engineering Board to bring its currently committed

work to orderly completion and to enter a period of 'hibernation' pending an appraisal of its future.

"There is an obvious moral to this story. I have described to you various conditions that seem necessary in striving for a national perspective in meeting the need for continuing evaluation of public policy alternatives.

"However necessary, these conditions clearly are not in themselves sufficient. Something more is needed: finding this something is a responsibility we all share."

\$5,000 Reward

... if you can buy a smart a CRT data terminal for less than SLI offers!



Intelligent CRT Checklist:

- | | |
|---|---|
| ☐ microprogrammability | ☐ graphics for vector and curve generation |
| ☐ editing power | ☐ APL terminal capability |
| ☐ display/control command | ☐ ultra-reliable plug-in boards |
| ☐ unique text editing and page justification | ☐ price (SLI's start at only \$2,975) |
| ☐ computer interfacing | |

For more information (or your reward):

SUGARMAN LABORATORIES, INC.
3 Fairchild Ct., Plainview, N.Y. 11803

THROUGHPUT

ARE YOU GETTING ALL YOU DESERVE?

THESE PRODUCTS FROM BOOTHE MANAGEMENT SYSTEMS CAN HELP YOU ANSWER THIS QUESTION WITH A POSITIVE "YES"

SPOOLER

SPOOLER provides an economic printer output spooling routine for DOS installations. It allows the printing of output to be independent of the generation of the output. The technique employed by the SPOOLER is to write the output onto disk as it is being generated, then write from disk to printer as the printer becomes free — performing all of its functions in a partition as small as 4K.

BCCXREF

BCCXREF will reduce by over 50% CPU usage for the generation of the CROSS REFERENCE listing provided by ANS COBOL. BCCXREF will significantly reduce elapsed time in the compiler partition or region, increase throughput, and allow greater system usage for other purposes.

DOSRELO

DOSRELO provides a method of making DOS program self-relocating. DOSRELO accomplishes the self-relocation capability for all programs, regardless of the language, by adding entry point logic to the object code of the program before the Linkage Editor catalogs it on the Core Image Library.

CIMS

The Computer Installation Management System (CIMS) provides a method to supply management with pertinent information in the utilization of their data processing hardware. CIMS accepts data collected by the System Management Facility (SMF), formats the data and presents the data in varying sequences and formats. Reports for job accounting, multi-programming throughput, hardware analysis, and others are provided.

GET ALL YOU DESERVE!

write or call

BOOTHE MANAGEMENT SYSTEMS
A DIVISION OF BOOTHE COMPUTER CORPORATION

555 California St. • San Francisco, CA 94104 • Tel. 415/989-6580

Immediately available for your free trial use with no obligation, of course.

Accepted by Banks, Aerospace, Oil, Universities, Accounting, and many other firms.

FJCC Banking Session

Electronic Transactions Will Cut Bank Paper Jams

By Michael Merritt

Special to Computerworld

ANAHEIM - Banks are more interested in doing away with checks than most people would expect, according to an FJCC session on "Computers in Banking and the Electronic Payments Mechanism." And some bankers are pretty interested in some non-traditional computer-aided banking techniques.

A major concern of banks is the overload of paperwork, according to John Reed, a vice-president of First National City Bank in New York. Reed sketched the size of the problem of dealing with all the paper generated in paying a year's bills and cashing a year's checks in the U.S.

There are about 66 billion transactions a year of over \$2, Reed said. Of these, about 50 billion take place outside the home - purchases at stores, money deposits at banks, and the like; of this 50

billion, about 12 billion involve checks.

Another five billion transactions take place at home or through the mails - sitting down and writing checks to pay bills, for example. Five billion more transactions involve individuals and institutions - five billion payroll, social security, pension and welfare checks. And institutions - companies, banks, government - account for almost six billion transactions between each other.

Bankers are attacking this morass of transactions in several ways, Reed said. Some banks have begun to offer jumbo checks - one signed check that directs the bank to pay several bills at once. Jumbo checks can cover rent, mortgage payments, bank credit card bills, telephone, water, light and other bills, all at one crack.

Another technique is use of automatic crediting and debiting of checking accounts. The bank, for example, may have

an agreement with an employer to automatically deposit payroll checks. Instead of giving a worker a check, the company sends a payroll tape to the bank, and the bank deposits the "paycheck" without paperwork.

Individuals can also set up programs that direct banks to automatically pay certain recurring bills - rent, mortgage payments, charge accounts - with no intervention from the customer. The individual sets a maximum payment which the bank can't exceed, and forgets about writing checks for those bills. The bank, in turn, doesn't have to process those checks.

The major problems lie in the large area of outside purchases, though. Point of sale terminals, linked by communications lines to computers, and credit cards, Reed said, can deal with paper profusion in this area.

One Ohio banker described a series of

computer-aided advances. Gordon Jelliffe of the City National Bank of Columbus ascribed the possibility of dealing with these new techniques to four advances:

- Increased computer capability, permitting maintenance of all a customer's records on a single file;
- On-line entry, for point-of-sale terminals;
- Automated banking equipment, permitting machines to take over most routine teller functions; and
- Acceptance of plastic cards - 50 million customers now have bank cards, Jelliffe said.

Automated teller equipment is making possible a new type of branch bank, he said, using drive-up machines. Only two people staff the branch, since, according to City National studies, over 60% of banking functions can be carried on by the drive-up machines - including deposits and cash withdrawals, and transfers between checking, savings, and credit card accounts.

Drive-up check cashing is possible because of a magnetically encoded bank card - as opposed to a credit card - Jelliffe said. The coding contains account number, route and transit number, and bank number. At City National, he noted, only 24% of the customers have bank credit cards, so the bank card is necessary for the automated teller equipment.

He also described an experiment conducted by his bank in a Columbus suburb. About 150,000 customers were given encoded credit cards, and a large number of stores were given point-of-sale terminals, including grocery stores, and even the cashier at City Hall.

The nine month experiment resulted in several conclusions.

- The technology for point-of-sale direct data entry is available now.
- Consumers and merchants will accept on-line sales - with one reservation. Customers were intolerant of waiting very long for credit authorization at the check-out counter, Jelliffe said.
- The system isn't cost effective just on the basis of credit authorization; less than 3% of the authorizations were rejected. There are other considerations, such as inventory control, that make the system attractive, though, he said.

The bank president also said it is necessary to have a terminal that accepts both bank cards and credit cards, and indicated his bank's use of an as-yet-unannounced terminal made by Addressograph-Multigraph seemed likely to fill the bill.

Electronic Clearinghouse

Inter-bank handling of paperless entries - automatic credits and debits for example - is a problem that appears to have been overcome in California. Russell Fenwick of the Bank of America described the recent completion of inter-bank arrangements for dealing with magnetic tape formats, authorization procedures standards, and legal problems for computerized check clearing. He said the system had just gone live, and processed its first 29 entries.

George W. Mitchell, a governor of the Federal Reserve System, suggested several reasons why progress in this sort of electronic transfer system has been so slow. People's money habits change slowly, Mitchell said, and people haven't been persuaded that electronic banking is to their advantage. He noted that "bankers aren't generally innovators," and that, since the cost of handling paper is split up between many people, no one group has a profit incentive for pushing for the elimination of paper hassles.

Finally, he noted, electronic systems would eliminate "float," the quasi-money that exists between the time a check is deposited in one bank and money is taken out of the check writer's account in another.

Save money.

Spend a few bucks for the best data entry system.



Sometimes spending less ends up costing more.

Unless, of course, you're content with a key-to-disk system that handles only a few hundred records at one time. Or provides a mere handful of input record formats. Or allows verification only at the end of a complete batch.

On the other hand, such a limited system probably does not have enough performance for your data entry requirements.

Before you buy on price alone, consider the Entrex 480.

System 480 is the most powerful key-to-disk system on the market. The most flexible. The easiest-to-learn and easiest-to-operate. With up to 32 DATA/SCOPE keystations. A 65K processor. Up to 10,000,000 bytes of intermediate disk storage. A variety of tape drives for final output. A printer. Communications capability. And the most comprehensive software in key-to-disk.

System 480 produces a single, clean, fully-edited output tape ready for input to your main computer. Or for data communication to another 480, System/360/370 and other business computers. Output record formatting and



reformatting is unlimited. You can explode or implode records. Emit repetitive data. Produce multi-file output from a single source recording - with complete independence of format between tape and print output. And our exclusive **HELP!** button guides the operator through all normal functions and displays alternatives for any situation she's unsure of.

This is only part of the System 480 story. The best part is that System 480 lets you do everything you've always wanted to do in data entry... and save money, too! So call or write today to see how easy it is to go first class.

See for yourself, in these cities:

Montreal
Toronto
Boston
Detroit
New York
Chicago
Philadelphia
Baltimore
San Francisco
Los Angeles
Dallas
Atlanta
Houston
New Orleans
Miami

**Not just data entry.
Real savings.**

First class is the best way to go. Please send me more information immediately on System 480, and where I can see it in action.

name _____
title _____
company _____ phone _____
address _____
city _____ state _____ zip _____

ENTREX

ENTREX, INC.
168 Middlesex Turnpike
Burlington, Mass. 01803
617-273-0480

More Secure (But Vulnerable) Systems Expected Soon

By E. Drake Lundell Jr.
Of the CW Staff

ANAHEIM — Today computer users don't understand what they mean by data security, much less how to measure the effectiveness of their security measures. But with research now underway and with combinations of external monitors

Security: What's Ahead?

and internal controls, users can look forward to "more secure" systems in two to four years, the ACM Special Interest Group on Computer Systems Installation Management was told.

"In data security we are at the stage of trying to define what we mean and finding ways of measurement," Donn Parker, session chairman from Stanford Research Institute, said.

There are three different types of security used today, Parker indicated, including organizational security, physical security and internal computer security.

But, he indicated, there is a debate currently on different security styles, including decentralized versus centralized access authorizations, the potential affects of unauthorized access on a firm's assets, and the population of potential system penetrators.

External Monitor

There is also a debate over whether computer installations should put their security systems within the main computer in their center or use some sort of external monitor to oversee accesses to the main system and to prevent unauthorized persons from compromising the system.

Jerry Kennedy, president of Basic Computing Arts, described one approach to the separate control, the Data Sentinel system monitor manufactured by his firm.

This system, based around a PDP-11 and Decapex, is located completely separate from the main computer room and attached to a 360/370 by a "tamperproof" cable.

In its present configuration it monitors all incoming requests to access data bases that a firm wishes to keep secure. It stores all of the passwords used in the system, and compares a user's password against a table to determine level of access.

If the user does not have a password that would allow him to access a particular data base or file, his call is terminated.

The system has four basic features, he said, in that it controls authentication of the operating systems and application programs at Initial Program Load, monitors the entire system for requests for data, provides interdiction capability, and provides security people and management with reports to help them spot potential penetrators of the system by correlating requests for access.

The unit, he said, does not require any special programming in the host computer, and a security guard can alter the passwords used on-line even while the host computer is in operation.

Confident Users

Phil Martinelli of Crocker National Bank in San Francisco, the first user of the Data Sentinel system, indicated the use of such external monitoring systems made the non-DP people in the company feel the installation was secure.

"The auditors feel comfortable with the external monitoring systems," he said, "because they feel they can keep an eye on the programmers and other DP people."

He also indicated that whoever has the responsibility for overseeing the operation of such an external monitoring system should be outside the DP department.

At the same time, however, he indicated the system did increase the overhead required to operate the main system and that users would have to make that trade-off if they decided to use such a monitor.

Robert Abbott of Lawrence Livermore Laboratories stated, however, that such external devices could not really protect a system from the systems programmers who were closely familiar with the operating system used in a computer installation.

Opportunities Exist

"While there are possibilities in such tools," he indicated, there are still many opportunities for programmers to subvert systems."

And he noted that most intercompany theft is performed by personnel with five to 10 years experience with that particular organization — the very people who would be the most likely to be most familiar with the user's operating system and security procedures.

"They also know how you are protect-



Martinelli

"non-DPs feel secure"



Abbott

"opportunities to subvert"



Parker

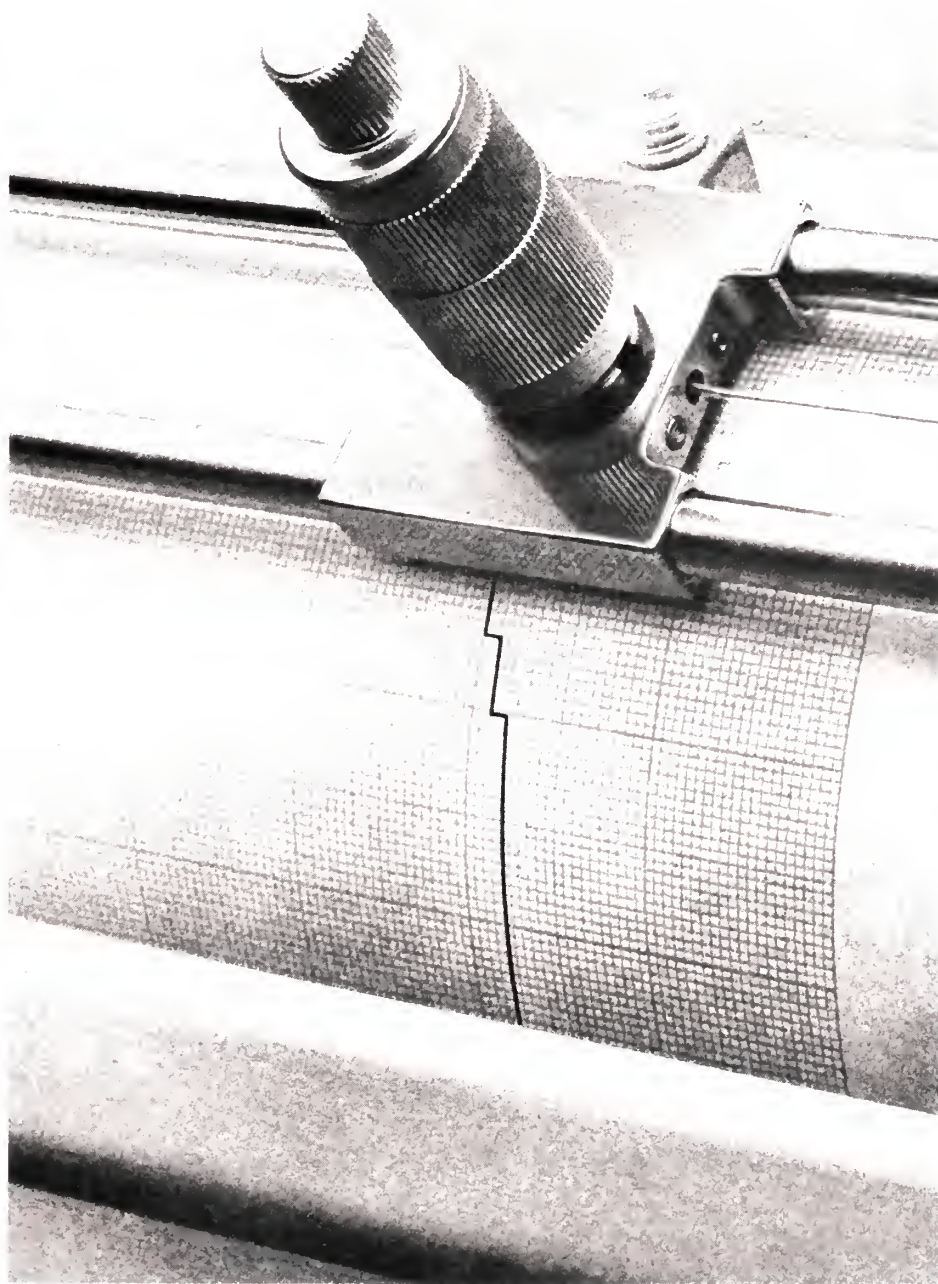
"define what we mean"

CW Photos by E. Drake Lundell Jr.

security arrangement.

In all, Abbott indicated it would be two to four years before we can develop "more secure" systems, but he indicated that even those would be vulnerable to the really talented systems programmer in all likelihood.

COMSTOC® papers and films. No hop, no skip, no jump.



When you're doing computerized plotting, a skipping pen is the last thing you want.

Or lines that blot. Or dumbell. Or ink that dries improperly. Or plotting that reproduces poorly.

K&E took care of all that. Developed COMSTOC papers and films. With specially engineered surfaces, precision alignment, and precision inking.

End of trouble.

But we went further. We created all kinds of grid options—not just standard grids, but special grids, reverse side printing, matching colors, etc.

And then we formulated different grades of media for specific jobs. So we offer translucent paper, natural tracing paper, and transparentized tracing paper (with an engineered drafting surface for fast, clean erasures, or additional drafting requirements). As well as HERCULENE® films (for permanent records and sharp reproduction). And scribeable and peelable films for coordinatographs.

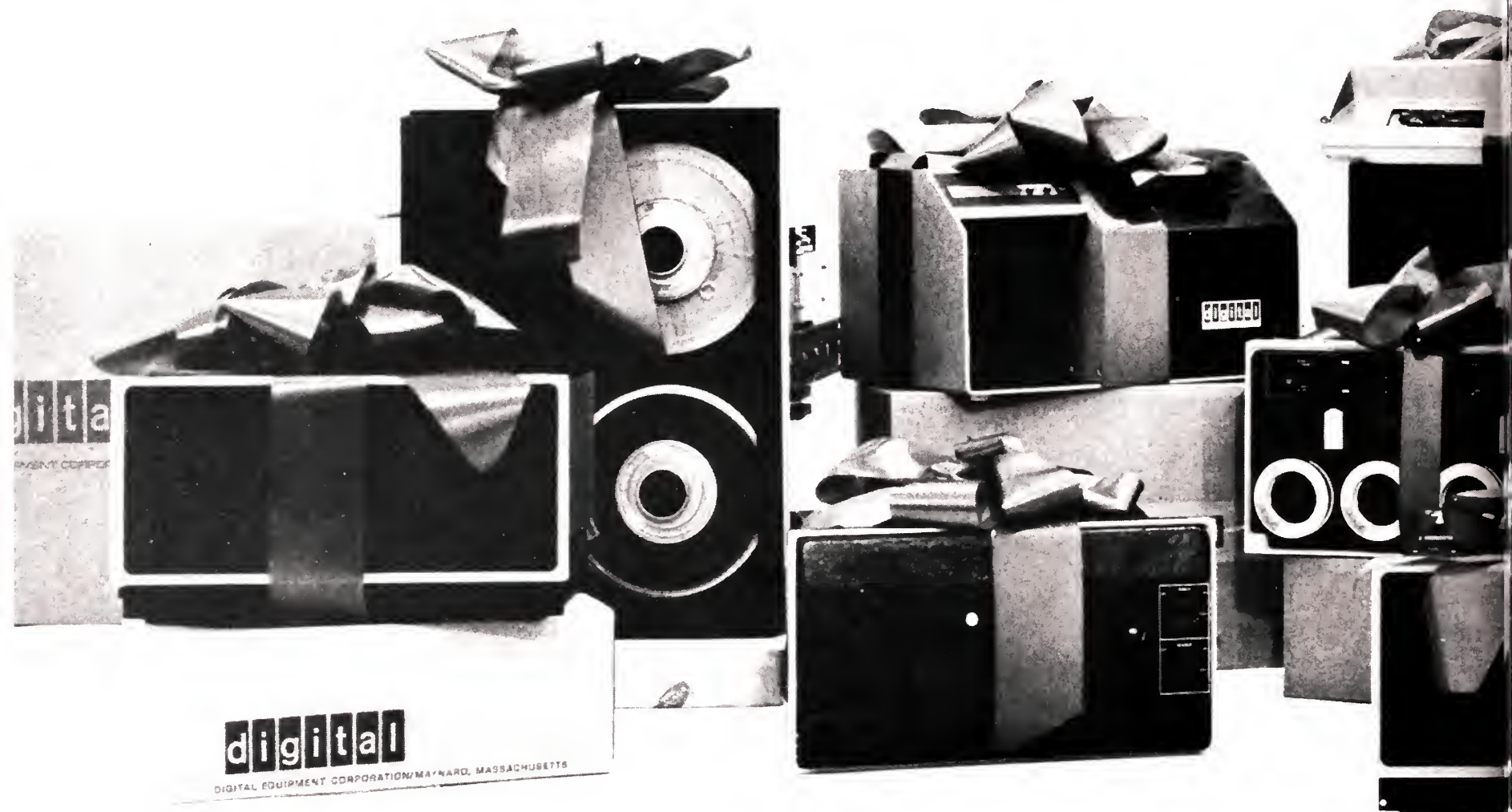
We'll also supply pens, inks, and pen cleaners—all specially designed to eliminate plotting problems.

And if you need special media, grids, or formats, we'll make them for you in 1, 2, 3, 4, or 5 colors. And repeats up to 54". Talk to your K&E representative. Or contact Keuffel & Esser Co., 20 Whippany Road, Morristown, N.J. 07960.

KEUFFEL & ESSER CO.



60 Christmas gift ideas



Give your PDP-8, 8/L or 8/I the newest technology. Like some memory. Or discs. Or magtape units. Or line printers. Paper tape reader/punch. Communications equipment. A/D converters. Cassettes. DECwriters. CRT

displays. Or what have you.

Whatever you get will come with all the power supplies, cables, modules, prints, bits and pieces you'll need.

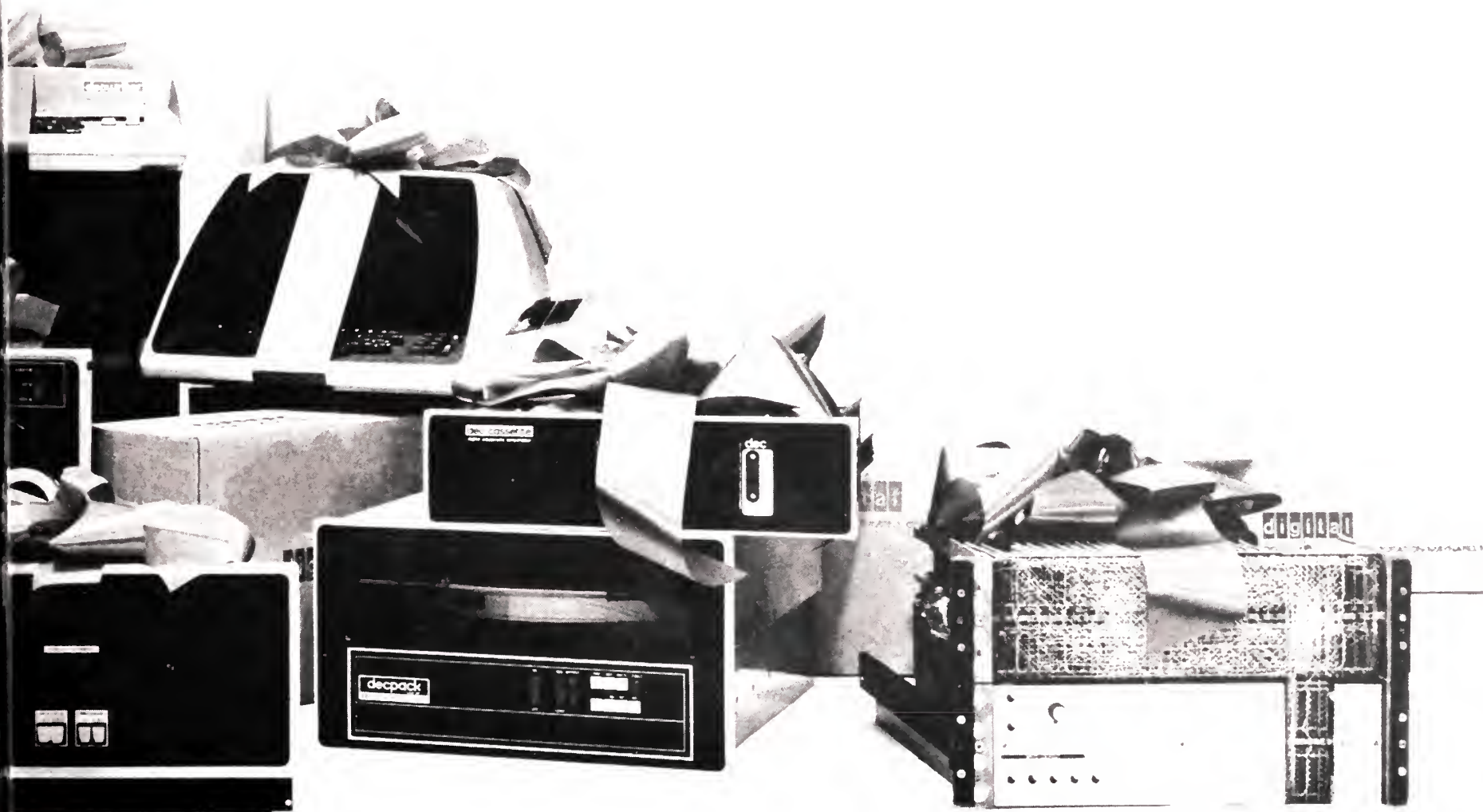
And we've brought down the prices by as much as 50%.

You'll get the same kind of

delivery, installation, support, software and warranties that brought you to Digital in the first place.

That's what happens when you buy Digital. You get a whole group of us whose only job is supporting people who

for a 3-year-old PDP-8.



already have our computers.

Return this coupon or call us at (617) 897-5111, ext. 2787 or 2058 and ask for Bob Reed. Digital Equipment Corporation, 146 Main St., Maynard, Mass. 01754. Attn: Traditional Products Group.

Yes I own a PDP-8 that I might consider expanding.
Please send me all the facts or call me at:

Name _____

Title _____

Company _____ Phone _____

Address _____

City _____ State _____ Zip _____

Present System _____

Plan to attend DECUS, November 29-December 2, Royal Inn Hotel, Anaheim, California.

digital

Despite Decreased Budgets

DP Use in 'Information Centers' Makes Great Strides

By Michael Merritt

Special to Computerworld

ANAHEIM - Despite budget crunches and lack of strong mainframe manufacturer interest, the application of computers to library problems is developing rapidly, in both theoretical and practical ways. This was the overall impression of an FJCC User Application Seminar on Computers in Information Data Centers - or computers in libraries.

The 10 papers presented at the all-day session displayed the depth and breadth of the last 15 years' efforts in analyzing problems connected with using libraries - studies in techniques and methods of indexing and analyzing data, system analysis and system design criteria to maximize end-user effectiveness.

The session also saw described a number of working systems which demonstrated the usefulness, problems and cost effectiveness of computerized library functions.

The most comprehensive system described was one now at Stanford University. In its first stages of implementation, it already supports the acquisition and cataloging functions of the university's libraries.

Stanford's Ballots (Bibliographic Automation of Large Library Operations using

Looking at Libraries

a Time-Sharing System) is an on-line, interactive system, using Sanders 804 programmable CRTs running through a 360/67. In the words of Alan Veener, one of the designers of the system, it takes care of books from the publisher's warehouse to access by end user.

The system automatically creates purchase orders, catalog card sets, book labels, various file slips and several management reports. It permits an operator

to search a file to see whether a requested book is already owned by the library, and provides several different searching indexes - author's name, words in the title, etc.

Hank Epstein of Stanford, another designer, said the system has had an average response time of two to three seconds with 40 to 60 terminals on-line. This is due in good part to the use of programmable terminals, which are loaded from a PDP-8/1 between the terminals and the 360, he said.

Design Criteria

Motivating a user to use the system - especially if he is leery of computers - is a major requirement of system design, according to Mary Elizabeth Stevens, a leading theoretician and consultant in the field, formerly of the National Bureau of Standards. Stevens listed a number of desirable ways in which an on-line retrieval system should be responsive to

users:

- The system must be easy to use. The display format must be natural, and the system should use an understandable language or mnemonics, rather than arabic numeral codes.

- There should be an easy way to express queries.

- Output should be easy to obtain.

- There should be simple means of inserting and deleting information.

- It should be easy to learn to use the system - and designers should seek to standardize as much as possible languages and control instructions.

There should be user aid facilities - a way to call for help, "please wait" notices during lengthy searches, and status information such as file dates, and the number of other users on the system.

Another important question to the user, Stevens said, is the quality of the file. It is necessary to know if there is missing, misleading or misspelled data.

Blocs System

There is a cheap way for libraries to keep a constant, on-line track of where their books are, according to Michael Smith of Bucknell University. His system, Blocs (Bucknell University On-Line Circulation System), uses a combination of CRT and static card reader to put information into a PDP-8, which maintains a journal file of outstanding books, as well as hold requests, on a Sykes Datatronic tape cassette drive. The system is also tied into the University's Xerox Sigma 7.

Smith said his staff had done all the programming for the mini-based system, including the writing of an executive for the PDP-8. Yet total implementation cost for both hardware and software - exclusive of the Sigma 7 - was \$68,000. He said operating costs, again exclusive of mainframe charges, were \$8,000 a year.

As well as keeping track of the books, the system permits generation of a number of statistical analyses for management reporting. Checkout breakdowns by time and user classification (undergraduate, graduate, faculty) are possible; one can find out which books an individual user has outstanding and see which types of book are in demand.

Smith admitted it would also be possible to find out which books an individual had been reading over a period of time, "if you could get the director of libraries to let you do it."

Minis the Answer?

A library encounters unique difficulties in trying to use a large shared computer, according to Audrey Grosch of the University of Minnesota. The problems she mentioned included:

- Low user priority.
- Excessive core requirements for a multiprocessing environment.
- Requirements for unavailable direct access storage.
- Need for extended character sets on printers.
- Need for on-line data entry.
- Need for frequent batch runs.
- High mass storage costs.
- Poor understanding of library needs by computer center programmers.

Rather than try to contend with these problems in a computer center environment, Grosch said, a team at the Minnesota Bio-Medical Library is now designing a stand-alone system. But rather than use a large-scale computer, with an estimated cost of \$2 million to \$3 million, the Minnesotans are implementing a mini-computer system.

A powerful mini with 12 terminals, 320M bytes of mass storage, tape and printer costs about \$220,000; six of these systems, each serving one local library in the university, would cost about \$1.3 million, and take care of all the university's needs except for the central main library.

(Continued on Page 17)

Here are 12 questions you may have to answer (and the facts you need to answer them).

What is Easytrieve? Easytrieve is an easy-to-use information retrieval, file maintenance, and report generation system written for the IBM Systems 360, 370 and RCA Series 70.

How is Easytrieve used? A few punched cards containing free form English statements are input to your card reader. These cards become simple parameters to the Easytrieve program which, in turn, immediately executes against any of your data base files.

Are any special forms or coding sheets necessary? No. You can even write your first Easytrieve program on the margin of this ad!

Is it necessary to "compile" or "assemble" when using Easytrieve? Never. Easytrieve is a "load and go" system.

Can Easytrieve process files that contain different record formats? Yes.

What kinds of outputs will Easytrieve generate? It will produce:

1. Automatically centered and formatted reports on up to five keys with subtotals on up to five different levels,
2. automatically formatted mailing labels with complete flexibility regarding number across, size and shape,
3. test files on cards, disk or tape (You can select every Nth record, reblock, shorten or lengthen record size, and reformat records),
4. punched cards (automatically or user formatted), and
5. multiple output subfiles and/or reports from a single pass of a master file.

How fast is Easytrieve? Easytrieve operates at I/O speed. It normally executes 3 to 4 times faster than tailored COBOL programs, and executes

faster than most assembler programs written for general or specific applications.

How much core does Easytrieve require? It requires 24k for DOS and 45k for OS.

How much specialized training do Easytrieve users need? Since Easytrieve has English language statements, non-technical people can perform basic tasks with just a few hours training. Trained programmers need only a brief introduction to Easytrieve's capabilities.

Is Easytrieve available on a free trial basis? Yes. A demonstration, an introductory training session, and a 30 day trial are free and without obligation to prospective users.

How does Easytrieve compare in price to packages with similar capabilities? It's about half the price of most comparable packages, yet it has more features and capabilities than many of its higher priced competitors. The single-file-input version sells for \$4,800, while the multi-file-input version sells for \$6,000. Lease arrangements are available for both versions.

What's the best way to take advantage of the free trial offer? Fill out the form below and mail it to our corporate headquarters in Silver Spring, Maryland. We'll arrange to have our local representative demonstrate the Easytrieve retrieval and reporting system on your computer and leave it with you for testing.



RIBEK Corporation

Montgomery Center
8630 Fenton Street, Suite 615
Silver Spring, Maryland 20910
Phone (301) 587-0115

☐ Please have your Easytrieve engineer call me

☐ Please send me information on Easytrieve.

Name _____
Title _____ Computer System _____
Employer _____
Street _____
City _____ State _____ Zip _____
Business telephone _____ Date _____

DP Solving Library Problems With New Methods

(Continued from Page 16)

This would give the designers an extra \$700,000 to \$1.7 million to spend on software, Grosch indicated.

She mentioned, though, that no mini manufacturer currently provides an acceptable real-time disk operating system, and that the Minnesota team will design its own, though it will use a vendor-supplied system during the first design phases. She said "the real reason" libraries are not now using minicomputers is the need to do their own programming.

The Minnesota system will provide all normal library functions, including acquisition, accounting, serials control and circulation.

Many Data Bases Available

The session did not confine itself solely to computers in traditional libraries.



Joe Ann Clifton of Litton Industries chairs session.

There was also emphasis on technical libraries and data bases.

The Federal Environmental Protection Agency has several libraries that maintain about 45 computerized data bases on a wide range of environmental, physical, toxicological, chemical and economic matters. Though the data bases are primarily bibliographies, there are also some data data bases, such as one on solid waste disposal.

"Our one criterion has been cheap," according to Morton Friedman of the agency's Cincinnati National Environmental Research Center. He detailed the ways the center is able to access such a wide range of information at very low cost — primarily by accessing existing bases on a use-cost basis. His staff of 13 librarians now averages about 20 searches a week, and the rate is increasing, Friedman said. He expects the rate to plateau at about 200 searches a month.

Friedman also mentioned the problems of a young agency just getting started in a new field. "We don't even know to which data bases we want to have access yet," he said.

The data bases are available to the agency and to the agency's contractors, Friedman said.

Software Library

"There is an information gap in software dissemination," according to Robert Panek, who described the computerized file of software routines used at North Am-

erican Rockwell. NAR, a very large user, has paid for the writing of many programs, but, due to the size of the organization, existing programs are sometimes recreated because nobody knows an original already exists.

NAR's solution is to use Tips — Technical Information Processing System — according to Panek. Tips maintains a file on some 1,200 scientific software packages indexed by descriptive terms (i.e. Center of Gravity for a program that calculates a center of gravity), author's name, program title, document number, contract number and accession number. These files, compiled from 13 NAR libraries, are available to engineers and managers.

In 15 months' use, Panek said, there have been 12 known usages of programs discovered through the system. He estimated that writing these programs from start would cost over \$40,000.

Auto-Indexing

Stella Keenan, executive director of the

National Federation of Abstracting and Indexing Services, outlined the recent history and current developments in problems of automatic indexing and automatic language processing — enabling a computer to generate indexes from raw input data by itself. She indicated there would soon be a marriage between the efforts of researchers dealing with abstract problems, and actual system users.

She pointed out the costs of getting information from scholarly papers into computers may soon drop drastically due to the increasing use of automated typesetting by journals. The tapes for running typesetting equipment can be read directly by computers, she noted.

This lower cost, coupled with lower hardware costs, spells a radical change in on-line data bases, she said. Rather than maintaining just bibliographic files, it may soon be feasible to maintain files of actual data — texts of papers rather than citations or abstracts. This results in a system that can give answers rather than bibliographies, she said.

We helped convert the Cleveland Trust.



Going from DOS to OS isn't exactly a heavenly passage.

But DUO 360/370, UCC's exclusive conversion software, can help you pave the way.

Look at how Ben Lechowicz, Assistant VP of Systems Support of the Cleveland Trust Company put it: "We were maybe four months into OS and pretty green when we took DUO. The weekend we installed it, one of the people in operations coded an application, we cataloged it on the OS system and ran it right off in a matter of eight or nine hours. I was convinced."

With DUO you run your DOS programs under OS control without re-programming! You simply link edit to your DOS object programs, so that DOS jobs reside as OS load modules. They then have full access to the speed and features of OS.

"Only one very intricate application of ours had to be re-written immediately," said Jerry McElhatton, V.P. of Information

Services. "The remainder have been converted without tying up a lot of high-priced talent. Today, only a handful of programs are still in DOS."

Let us give you the full story, call me, Sterling Williams, Product Manager—Special Products, at (214) 637-5010, or mail this coupon now, before you make any other deal.

We wouldn't want you to get burned.

UCC

UNIVERSITY COMPUTING COMPANY

800 UCC Tower P.O. Box 47911, Dallas, Texas 75247

Mr. Williams:
DUO 360/370 may be my salvation. Please rush me:
☐ more information ☐ someone to talk to

Name _____

Firm/Title _____

Address _____

City/State/Zip _____

Phone _____

Maintenance, or How Experts Save the Day

By Michael Weinstein
Of the CW Staff

ANAHEIM — Most panel sessions on maintenance usually start with lofty pronouncements of the need for better service and end with lengthy talks on how manufacturers get their expert customer engineers to the user's computer and save the day, or equally lengthy discussions of user experiences which generally don't relate to other users.

The FJCC session on "Maintenance and System Integrity" was no exception.

Bob Fitzsimmons of IBM highlighted the session speaking about IBM's Retain system for providing maintenance for the System 370 user.

Under this system various information clearinghouses are set up across the nation to help the individual customer engineer if he runs into problems. At the base of this service is a data base of all problems reported for all types of IBM 370 equipment.

If a CE reports a symptom, the engineer at the central station can access the data base through keywords and determine whether a similar problem has occurred. If the problem reported is in fact a repeat, a history of all corrective action is available for the CE.

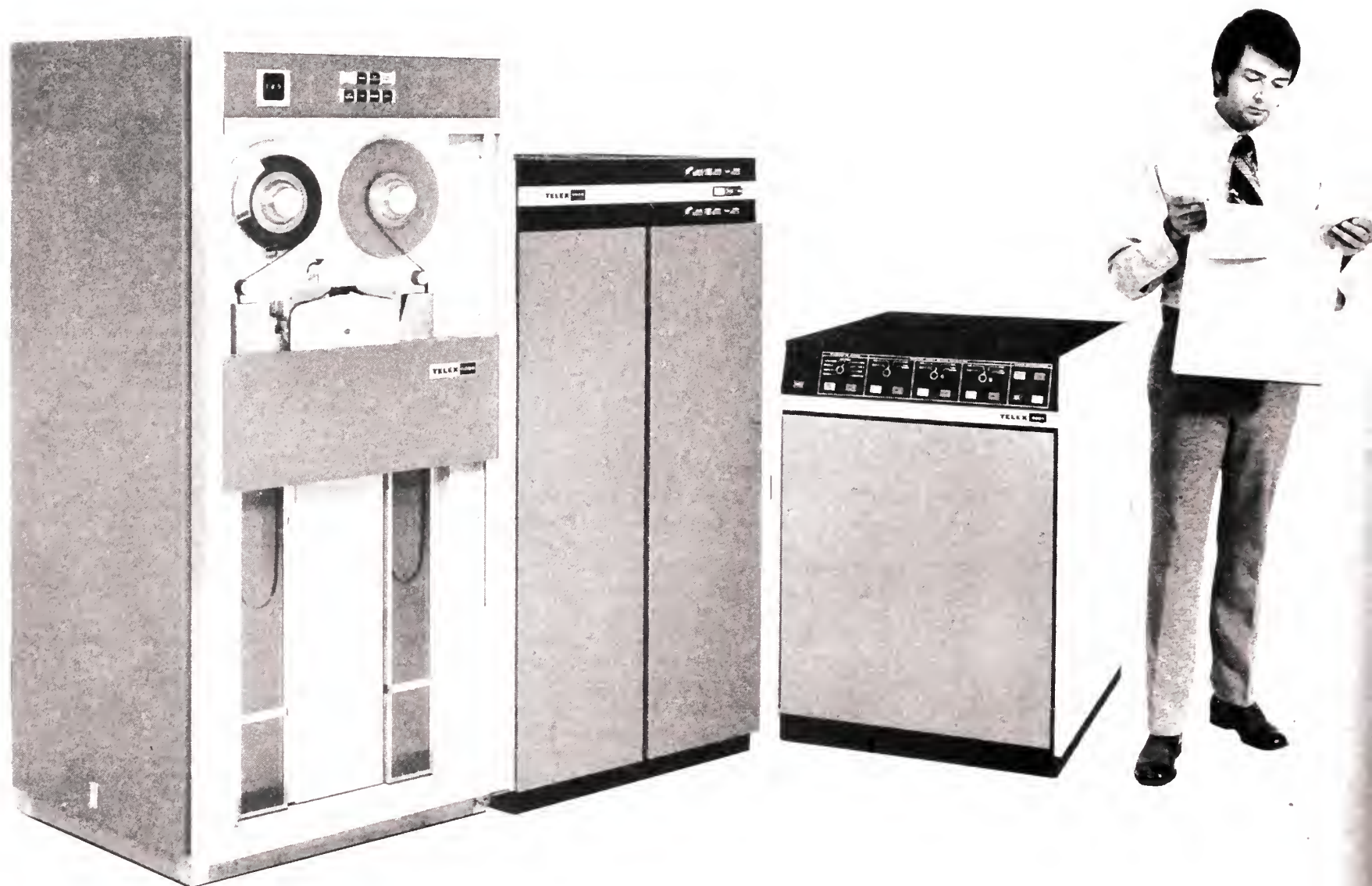
The second feature implemented is ability to hook the failing user's computer to a central system so experts at that center can run diagnostics on-line.

As a third source of information, manuals are recorded on microfiche so that information is easily retrievable.

Of more than passing interest is IBM's passing interest in maintenance for 360 users. When asked whether the same data base and services were being compiled for System 360 users, Fitzsimmons replied that they were but not with the same effort as for the 370 line.

TELEX Off-Line Printer System

*One of a broad spectrum of TELEX Peripherals . . .
Tape Drives, Disk Drives, Printers and Memories.*



SO MUCH...

A proven TELEX Train Printer with 1200 LPM speed, outstanding print quality and superior multi-part copy capability—the same TELEX unit that replaces the 1403NI on-line—with superior quality—*now* in an off-line package.

A proven TELEX Controller... a programmable mini-computer in itself for total format flexibility.

A fully maintained system with 24 hours a day, seven days a week service from the industry's No. 1 field service network... included in the basic monthly rental.

A system with unlimited usage... there's never an overtime or extra shift usage charge applied to any TELEX products.

A new standard for off-line printing systems... frees system partitions for other processing and totally eliminates computers dedicated to printing.

FOR SO LITTLE! \$1588 PER MONTH

Complete system including full maintenance...

1 TELEX Tape Drive, 1 TELEX Tape Adapter, 1 TELEX Controller and 1 TELEX Printer. 24 Month Fixed Commitment Plan

You'll get the full story from your TELEX representative. Or call or write us.



where the difference begins

TELEX
the PERIPHERAL COMPANY

TELEX COMPUTER PRODUCTS, INC.
6422 East 41st Street • Tulsa, Oklahoma 74135 • (918) 627-1111

TELEX, LTD.
101 Duncan Mill • Don Mills, Ontario, Canada • (416) 445-8050

TELEX EUROPEAN GROUP
213 Oxford Street • London W1R 1AH, England • 01 734-9131
Paris • Frankfurt • Zurich

Editorial

Stalled Satellite

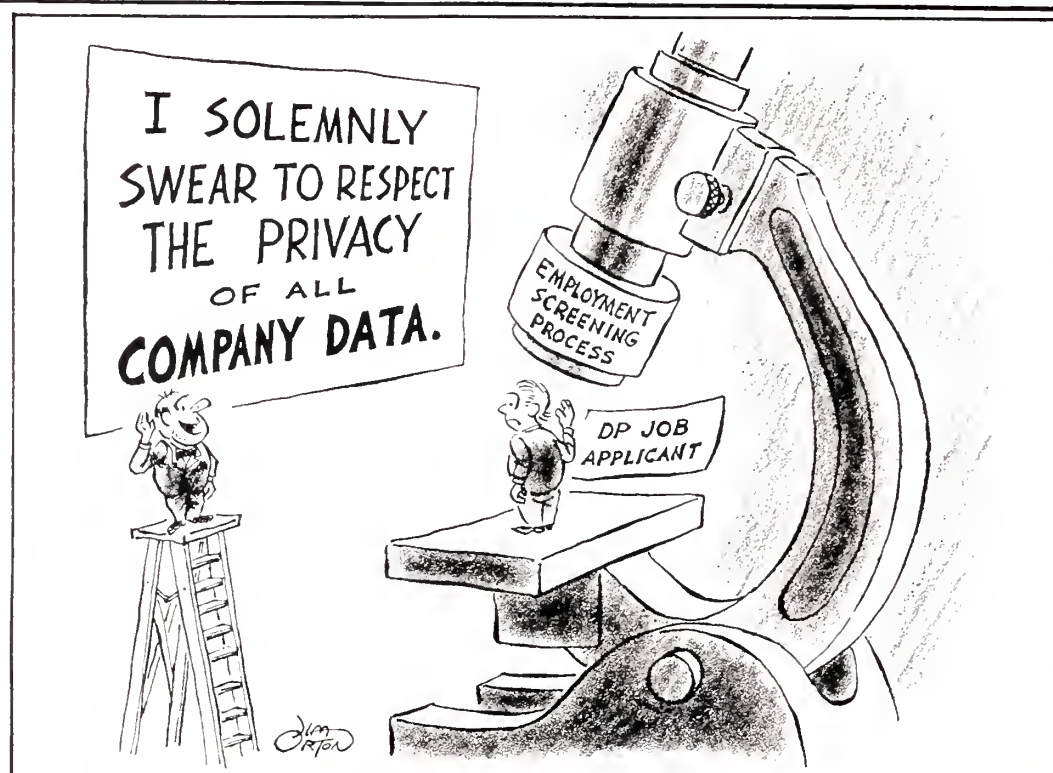
U.S. data users may soon be accessing satellite channels provided by Canada.

This is certainly a commendable display of cooperation with our neighbors to the north. But at the same time it focuses on the regulatory delays and red tape that often seem so insurmountable to the end user.

It is well within the state of current technologies for the U.S. to operate a domestic satellite system. And the economics of such a venture have been adequately determined by current applicants to the Federal Communications Commission. So why the delay?

The absurdity of the current situation is clear: we may have to pay foreigners to use a satellite that was launched by our own expertise in Florida.

An operational domestic satellite system to augment existing land-based facilities deserves top priority and an early decision from the FCC.



'Now Repeat After Me...'

Letters to the Editor

English Documentation Should Be Abandoned

Several letters to *Computerworld* over the last two months have advocated scrapping Cobol. The major reasons are that it is verbose, has an irregular syntax and encourages bad programming practice. It is noted that better languages are available.

However, when we examine Cobol within the context of total systems, it is obvious that the costs of writing Cobol source code, as well as the volume of language produced, are insignificant for normal-sized projects.

The real culprit is English used in feasibility studies, functional descriptions, programming specifications, program annotation, users' guides and operations manuals.

Why should we continue to use English with its irregular grammar and inconsistent orthography? English encourages ambiguity and other bad linguistic practice.

Since Esperanto can be demonstrated to be sufficient for technical documentation, doesn't it make sense to abandon English for documenting all new development? (It could, of course, be retained in our inventory for a few years for existing systems.)

If the Federal Government merely stops insisting that its documentation be in English and if minimal effort is devoted to Esperanto standardization, the rationale for English will disappear.

Obviously, a programmer or analyst who lacks the intellectual capacity to master more than one documentation language has no more place in our field than the person who knows only Cobol as a programming language.

James J. Pottmyer

Arlington, Va.

Standardized Assembler Would Help But...

Re: Thomas K. Tate's letter in the Nov. 22 issue — standardized assembly language as a Cobol replacement.

While I grant that a standardized assembler would be a great help in building up libraries and is something that should be done, I have the following objections to making it a Cobol replacement language:

- Assembly languages are very machine-tied by their nature. Direct interchange is almost impossible between two machines with different word size, different firmware, etc. without very fancy microprograms. If you are going to have that kind

of thing, why not use compilers?

- Improvements in a single machine would mean redoing the library. For example, if my computer gets multiply-divide circuit boards for Christmas, I have to go through the assembler library and rewrite those parts of my programs that have the software routines for those functions (and look for side effects from the changes). Or I can write a routine that will edit the library for me — another simple compiler-like device.

The same thing may be said about new storage devices and their write routines, etc.

Yet, with a high-level language, I just change the compiler and let the machine take care of what needs doing.

- High-level languages can optimize code with more care than a human can. The committees that put together some compilers had specialists to work on the best way to handle arrays, lists, etc. I don't feel you should expect one man to have a Master's thesis-level knowledge in all areas of information science before you let him write a program.

- We are getting better programmers today. High school kids in introductory classes are getting terminal experience in many places in this country. You can reasonably expect that within five years or so the novice programmer will be able to use and understand very sophisticated high-level languages — having worked with them since age 15.

You can also expect that machine-time costs will go down as technology advances. This means that the high-level languages could actually be cheaper to use (machine time vs. people time) and could be as good as or better than the average assembly language program.

Joe Celko

Atlanta, Ga.

Arena Scheduling Requires Too Much Student Time

Alan Taylor's article on Arena scheduling [CW, Nov. 15] covered many of the potential advantages of a technique for scheduling students to specific classrooms. In my opinion, Arena scheduling has some real advantages, but it is unfair to leave the impression that this technique is an unmixed blessing.

My primary objection to this type of scheduling is that it requires a large amount of time by students and staff to accomplish scheduling. This time comes out of the approximately 180 days of education in the academic year.

Too much time is being subtracted from education today in the form of half

days, student assemblies, review of material previously covered, and the like.

Further objections include:

- Balancing of course sections is uncontrolled. Does better education result from having 30 students per class for popular teachers and 10 students per class for unpopular teachers?

- Any student scheduled later in the process receives far fewer opportunities than a student scheduled earlier. Is this really democratic?

- Today's sophisticated computer-scheduling techniques permit special choices, such as scheduling a student's part-time job, so Arena scheduling is unnecessary for this purpose.

- Arena scheduling does not overcome the fact that some teachers are unpopular; it only requires that they carry a lighter workload than popular teachers.

A correction of the tenure system and/or introduction of a merit system is more likely to "correct" the problem of unpopular teachers. Moreover, having been a student, too, I recognize that a popular teacher may well earn his reputation by grading easily and assigning light assignments in addition to being an outstanding pedagogue.

- Most, if not all, of the alleged benefits of Arena scheduling are possible with today's conventional computer-scheduling techniques without the chaos and time loss implied by the "mad scramble," which I, along with Alan Taylor, envision.

Perhaps I should confess a bias or two. Our company does a great deal of school scheduling. It follows from this that I discern benefits in sophisticated school scheduling and that I believe computer systems can be developed to make increasingly wiser "decisions."

David W. Chaffin
President

Applied Data Processing
North Haven, Conn.

Looking Backward?

The article by Alan Taylor entitled "Scheduling System Did Less Work, Had Better Results" [CW, Nov. 15] was confusing and imprecise.

Arena scheduling is over 20 years old. It does not depend on the computer. Arena types of scheduling systems were originally designed for EAM equipment.

There are certainly many systems that combine the advantages of Arena scheduling with computer efficiency. An endorsement of Arena scheduling by Taylor will, I hope, not lead us back in time rather than proceeding toward more flexi-

ble, effective methods of scheduling.

Joseph A. Domar
Assistant Director

Office of Admissions and Records
University of Minnesota
Minneapolis, Minnesota

Independent in Canada

Re: Random Notes [CW, Nov. 8].

Data Logic Canada Ltd. provides Mark IV service as a completely independent Canadian company which has purchased two Mark IV service franchises.

Although Data Logic offers parallel Mark IV services in Canada, it is not in any way an agent of Informatics; rather, we are keen competitors for the rapidly growing Canadian market for Mark IV education, processing and contract programming services.

J.R. Edmondson
President

Data Logic Canada Ltd.
Ottawa, Ontario

A DPer in Politics?

The Nov. 15 issue of *Computerworld* contained an article on "System Analyst Loses as 'DP Candidate,'" datelined Redford, Ill.

Please! We have a bad enough time with our state highway department — it refuses to put us on the map because we are a township rather than an incorporated city. But, you did even worse — you put us in the wrong state! Redford Township is in Michigan.

Despite the fact we are over 75,000 strong in our population, we do not have a post office of our own. We are a branch of the Detroit, Mich., post office. And this despite the fact that if we were a city we would be the 15th largest in the state!

As far as Ralph Judd losing the election to Martha Griffiths, I can only say a computer man does not necessarily make a good politician. And what an asinine platform to use: "Put someone in Congress who knows computers." There certainly must be more to being a representative than that!

It is also interesting to note that Judd was stated to be a certified data processor, system analyst — yet he is not on the latest rolls of the local DPMA chapter. I know he does not have to belong to DPMA to receive the CDP — but my question remains: "Does he hold the CDP Certificate?" He did not use capitalized words in his reports, so if he is not a CDP, then he should not imply that he is.

James E. Taylor
Redford Township, Mich.

Attack on SDE Certification May Have Backfired

"Have you seen and taken the (Society of Data Educators') examination for the Certificate in Data Education (CDE)? I took the first one and found it bad in several respects. Typos were prevalent. Some questions tested knowledge of particular computers and operating systems (IBM). The author understood neither difficulty nor discrimination indices. Little normative data is available for the examination."

The Taylor Report By Alan Taylor, CDP



"Also, you might like to look at 'Data Education,' the society's journal. I doubt it will meet your standards."

"Enclosed is a copy of the first CDE examination together with my comments."

The above statement came from an individual connected with the CDP certification program (and who asked not to be identified). The statement came to me after I had reported on the SDE's CDE certification, and how it offers an alternative style of certification to the CDP certification and university-style examinations.

Basic Concepts

The CDE is based on the concept that practitioners are entitled to certification if they cannot be proven ignorant or dangerous; while university exams and CDP exams are based more on the concept that no one should be allowed to take an examination for some arbitrary long period.

This individual, whom I'll call Mr. X, is connected with the CDP examination, and was apparently writing in defense of its particular operation, and only doing so indirectly by attacking the opposition rather than by showing the strengths of the CDP exam.

Nor did Mr. X contradict my discussion of the differences in the two examination philosophies. Because his charges are interesting, it would be worthwhile to look at them.

Charges Examined

"I took the first one and found it bad in several respects."

Perhaps so — but why object without checking up on the later situation? Should we judge the Registered Business Programmer Examination by the fiascos involved in its debut? Or the 1972 CDP by the 1962 original? Mr. X, I am sure, would be the first person to object to such a method of operation. Why then should he use such an attack? I don't know — but let us see what further detail he has to back up his description of the examination.

"Typos were prevalent."

This certainly was unfortunate — but it happens in the best examinations. It can easily be remedied, so I am not too worried about it when considering the alternative examination philosophies. I would be worried if I were considering the results of a specific examination, but that is not what is being considered.

"Some questions tested knowledge of particular computers and operating systems (IBM)."

So what? Is this a criticism? Would Mr. X suggest that knowledge of the major business computers is inappropriate for professional DP teachers? Mr. X may be prepared to approve teaching by ignorant "experts" — but I am not.

I think that what Mr. X has done here is to forget that the CDE examination is *not* the CDP examination. It checks out DP teachers, not practitioners. A practitioner can be well-qualified to practice DP without necessary knowledge of IBM equipment; however, the teacher had better know something about the IBM line so he can talk with his students.

Of course, Mr. X may be trying to react to my reputed anti-IBM attitude. Sorry, but I want quality, real education — and that includes teacher-knowledge of IBM.

Does Author Understand?

"The author understood neither difficulty nor discrimination indices."

How awful — if true! I wonder if Mr. X knows the author? I wonder what evidence he has to offer? He gives none in his letter, or in the 13 pages of attachments, all of which I have gone through carefully.

More importantly, however — beyond giving employment to some of our more academic educators — does Mr. X suggest whether these measures of some types of examinations are important to this type of examination — a floor-level certification examination for a DP teacher already in practice?

That is the key question — and I know of no reason to suspect that any such validity has yet been established. When it has been, I have no doubt whatsoever that the Society of Data Educators will be happy to collaborate and produce an examination whose grading can be so measured. Until then, however, I cannot see that Mr. X has done anything to prove the examination faulty.

Incidentally, although not being an educator specializing in the evaluation of examinations, I do question whether there have been some serious objections raised to the reliance on the use of such validation techniques.

Little Data Available

"Little normative data is available for the examination."

Very interesting. But still less is available for the older CDP examination. True, members of the Certification Council may receive long tabulations of difficulty and discrimination data — but these do not include content validation studies, nor are they available for outside study and comment. The charge may be valid — but it seems to me at best a case of the "pot calling the kettle black!"

SDE Journal up to Standard?

After his attack on the SDE examination, which only proves the absolute necessity of encouraging alternative forms of certification (as well as those like the CDP), Mr. X changes targets, and brings up *Data Education*.

I had mentioned the publication, in my original article,

noting that the SDE does insist on CDE applicants — at least taking *Data Education* for a year, and so does help to encourage them to stay up-to-date in their field.

(By contrast, the CDP authorities make no such effort, unless one includes releasing lists of CDP holders to local DPMA chapters as possible new member sources, thus "encouraging up-to-dateness.")

"Also you might like to look at *Data Education*, the society's journal. I doubt it will meet your standards."

I notice the implication that I had not looked at *Data Education* — apparently because I had not found it necessary to men-

"Attacks like this one on the SDE certification method reveal more about the weaknesses of the certification methods Mr. X is connected with than they do about the weaknesses of the alternative SDE-style of practitioner certification."

tion anything about such an investigation when talking about certification matters. Sorry to disappoint you, Mr. X — I had done my homework before I wrote.

But, just to convince myself, I have just taken from my files a randomly chosen *Data Education* copy. It happens to be fairly recent, but not the latest by any means. It is the issue of March 1972. Let us go over the contents together so we can see just what that comment about my standards really means.

Data Education, one must understand from the start, is for the practicing DP teacher. What interests us as DP professionals is whether the journal helps DP teachers keep up to date.

The first article in the journal is a feature on Ajax High School in Toronto. This school is representative of a spreading educational philosophy — allowing students to pick their own courses.

The article shows that in such circumstances the computer can carry out a double role — helping with the increased administrative chores, as well as being available for use in the DP classroom.

The article gives a nice case history which can be used to justify the expansion or initiation of a computer curriculum.

I give the editor of *Data Education* 10 points out of 10 for including the article.

Then a Professor Featheringham, of Central Michigan University discusses the comparative merits of programmed instruction, computer-aided instruction and learner-controlled instruction for the separate disciplines of console operator, programmer and systems analyst training.

Here we have some excellent pointers as to when *not* to use some techniques, and a real recognition that training for a console operator is not a subset of training for a programmer.

I wish that the DPMA/Certification Council would take some of these truths to heart when it designs study guides for the RBP and CDP examinations. Again, the editors get 10 points out of 10.

The rest of the journal is equally interesting — a staff account of the Soft Copy Conference and Workshop; a report

on a study in Groton, N.Y., which showed that justification for a degree in a DP program was not to be found in the local business needs; a 20-frame extract from a flowcharting exercise, a 14-page directory of films for DP education, and so on.

DP Education Concentration

Well, Mr. X? What is not up to my standards there? Perhaps you think that some of the material is not advanced enough? Not dealing with the future of virtual distributed machines? Or the functions of Codasyl?

True, I would like to see some of this in DP education — but I can hardly ask the editors to concentrate upon my specialty

and respect your intelligence. But I do not think that you have realized the SDE approach is a true alternative method of certification.

I think you believe that the only certification methods of value are university-style, or the CDP style.

Here the aim is to forecast future capabilities based upon apprentice-style training. (The CDP, for instance, is an attempt to forecast the potential of a data processor who has been in the industry for five years to be promoted to DP manager).

The SDE qualification, however, is a *recognition* of current capabilities, rather than a forecast of potentials. It is a very different, and, in my view, sorely needed certification, and one which should be respected.

Having it around will strengthen the CDP rather than weaken it.

Attacks like this one on the SDE certification method reveal more about the weaknesses of the certification methods Mr. X is connected with than they do about the weaknesses of the alternative SDE-style of practitioner certification.

(Readers wishing to contact the SDE for subscription, membership or certification data can do so at SDE, RR2/76 Union, Northfield, Vt. 05663.)

© Copyright 1972 Alan Taylor. Reproduction for commercial purposes requires written permission. Limited numbers of copies for non-commercial purposes may be made provided they carry this copyright notice. The views expressed in this column do not necessarily reflect those of Computerworld.

I value your interest, Mr. X.

The Computer Caravan welcomes



A Subsidiary of Sanders Associates, Inc.

as an exhibitor in the 1973 Spring Caravan

Sanders Data Systems, Inc. will exhibit and demonstrate both their 804 stand-alone and 810 cluster display terminal systems using standard software packages for remote job entry and on-line data entry and inquiry for business and industrial applications during the Computer Caravan.

The 810 system features a disk memory which can provide up to a five-million bit capacity, while the 804 series has a tape cassette transport for smaller application needs. Both systems will be seen in operation with 32 character-per-second and 200 line-per-minute printers, and a card reader.

What may we say about your company?

Call us: (617) 332-5606

The Computer Caravan/73

sponsored by



COMPUTERWORLD

Boston • Washington • New York • Atlanta • Houston • Anaheim • San Francisco
• Kansas City • Chicago • Cleveland



Special Services Increasing

ANAHEIM — Some users of computerized medical systems in Orange County, Calif., have gone beyond patient care systems and are providing some special community services.

Gerald C. Brady, analyst programmer in the Department of Medicine at the University of California, Irvine (UCI), told a special panel on medicine and health of a computerized research project in the cardiac-pulmonary section to help return to work people who have suffered a heart attack.

Brady described a stress evaluation unit which uses a minicomputer to evaluate six patient functions.

For example, a computerized walking machine is used which makes walking increasingly difficult for the patient and measures his energy output.

Brady also told of equipment the released patient carries with him to monitor his heart activity, and the data is then evaluated by a computer.

He said future projects include working with the orthopedics section of the

Department of Medicine to compare patient activity before and after hip and knee surgery.

Sue Ungerman, moderator for the panel and biostatistician for regional medical programs at UCI, reported on an automated stroke registry that led to the discovery of the deterioration of stroke patients after they were released from the hospital. As a result, volunteers were recruited to help the stroke victims.

She also told of resource agencies for the community listed on a computer to facilitate responses to inquiries from people in the community seeking help.

Donald A. Dennis, coordinator of medical education at St. Joseph's Hospital, Orange, told of an effort to analyze patterns of patient care by computer.

Meetings are held with the physician at his office to teach him how to analyze his own practice with his own data.

Medical Applications Range From Prevention to Discharge

By Marvin Smalheiser

CW Correspondent

ANAHEIM — Four computerized medical applications ranging from preventive medicine to a shock therapy system for patient discharge summaries were presented at an FJCC technical seminar on health and medicine.

An award-winning program called Prospective Medicine designed to identify potential health dangers before they actually become problems was presented by Dr. Charles Ross, president of Interhealth, San Diego.

The Prospective Medicine program is based on information gathered about the history of a disease, its thrust, its starting point, and the risk of death to a particular person based on personal characteristics and habits.

Ross said the program takes any kind of input, analyzes the various factors and suggests intervention procedures to prevent a disease before it occurs.

Dr. Norman Neches of Maimonides Medical Center, Brooklyn, N.Y., told of a pilot, off-line system based on a series of computer programs to create, store and retrieve patient discharge summaries.

"The system can produce periodic reports for the evaluation of the experience of any specific clinical department. A breakdown of the type of patient seen, the number of admissions and discharges, average length of stay, a compendium of all diagnoses, medical and surgical procedures and complications seen during the time period may all be obtained easily, he said.

Dr. William Helvey of Technicon Corp., Mountain View, Calif., told of Medical Information System I, a system now fully operational at El Camino Hospital, Mountain View. The system puts the entire 440-bed hospital on a computerized patient-care system.

The MIS I utilizes 54 video terminals with light pens, and about 25 electrostatic printers in the hospital, all connected to a 370/145 with seven disk drives located three miles away.

Patient security is protected, he said, by a private code which gives physicians access to information. It is set up to allow other personnel to get limited information appropriate to their tasks.

Howard Carrington of the Center for the Critically Ill, Hollywood Presbyterian Hospital, Los Angeles, described developmental research under way at a two-bed shock therapy installation that is fully computerized.

Systems Vendors Must Educate Users

Special to Computerworld

ANAHEIM — If the computer is to penetrate the medical world to the benefit of the user and the patient, the industry will have to embark on a market development program that will educate the user, according to Dr. Michael A. Jenkins of the Computer Medicine Department of the Office of the U.S. Surgeon General.

In a keynote address at the opening session of the day-long conference on Computers in Medicine, Jenkins urged data processors to make a stronger effort to educate hospital personnel and maintain a dialogue with them.

Jenkins, who is president of the Society of Computer Medicine, said the computer vendors should not go through repeated "show and tell" routines. "What is needed is critical analyses of what is good and bad about a system."

Computer penetration in the medicine and health fields, he said, has been "almost negligible" and he claimed the reason for the limited use is that buying units have not been defined.

Hospital Problems 'Underestimated'

Special to Computerworld

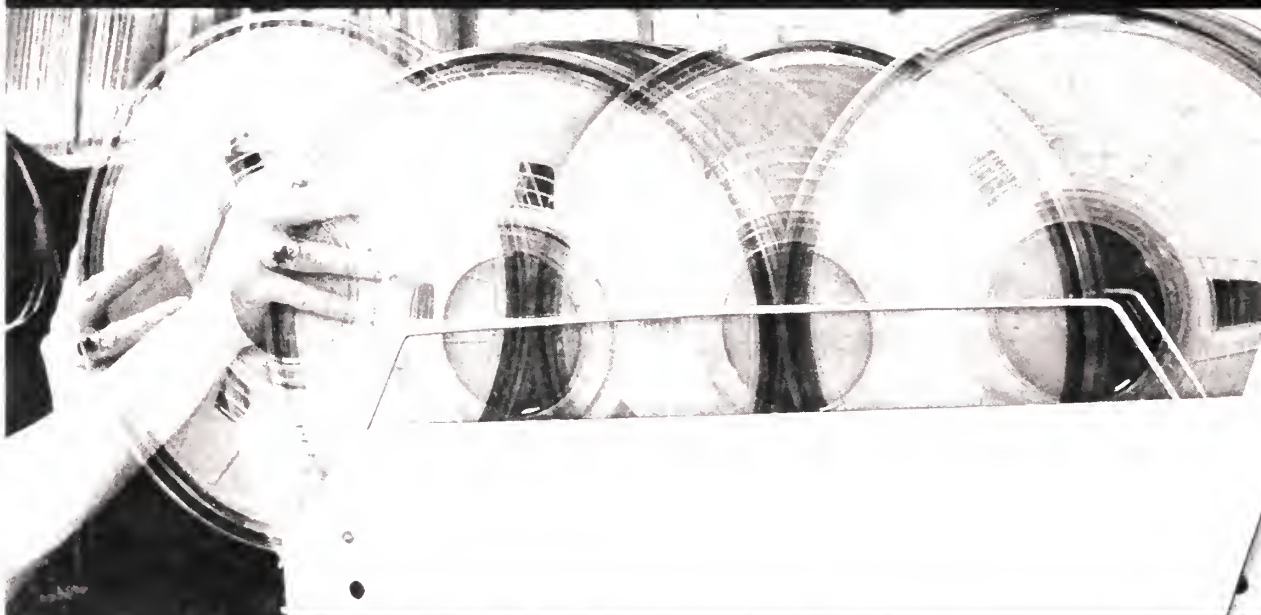
ANAHEIM — The data processing professional who has tried to serve hospitals has "littered the field with broken promises" because he underestimated the scope of the problem and he is still making the same mistake.

This was the consensus of a panel on hospital data processing at which data processors were urged to "find out what is going on in the hospital."

Gene E. Thompson, panel moderator and chief of Hospital Information Systems, Department of Hospitals, Los Angeles County, said there was a "lack of meaningful communication with doctors and nurses."

Mark Burstein, chief systems analyst for California Health Data System Administrators, presented the other side of the picture: "Hospitals don't understand what is necessary or involved. They want to overlay the data processing system over the manual system."

Want more tape-storage capacity with your present canisters and library?



Here's our angle.

Four degrees.

That's Tilt Shelf's angle of incline. Tilt Shelf stores tapes in tandem, two deep, and our little 4° forward angle allows the second tape in each slot to roll quickly into a Ready position when the front tape is pulled.

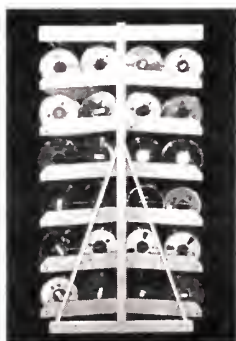
But the angle is just a sidelight; the big story is two-deep tandem storage. Because of that, Tilt Shelf can almost double your tape-storage capacity by using one storage shelf where you presently use two. That turns exactly 50% of your present, useless aisle space into working, profitable storage space. Thereby increasing your storage-density, which speeds up filing and retrieval, which lowers your retrieval costs.

Another bonus: your most-frequently-used tapes naturally wind up at the front of each

slot, further increasing your efficiency. And, perhaps the biggest bonus—you don't have to change canisters when switching to Tilt Shelf.

So—our angle can cut your tape-storage and retrieval costs, boost efficiency, increase your tape library capacity without increasing your rent, and other things. For the complete story, contact your local TAB representative. Or, write Tab Products Company, 2690 Hanover Street, Palo Alto, California 94304.

We'll show you some more interesting angles.



Tiltshelf® RSC 1972

TAB

PRODUCTS CO.

WE HATE TO GET CANCELLATIONS TOO...

**Pershing
& Co.**

120 Broadway, New York, N.Y. 10005 Members, New York Stock Exchange, American Stock Exchange

October 30, 1972

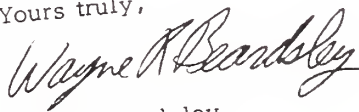
Mr. Justin Spring
Software Design, Inc.
872 Hinckley Road
Burlingame, California 94010

Dear Justin:

I am pleased to report that the use of GRASP at our installation has resulted in such a dramatic increase in our throughput capabilities that we are now able to process our entire nightly DOS work load on a single CPU. An impressive demonstration of this capability occurred recently when we were forced to process our entire DOS and non-DOS work load on a single CPU for a period of six days with all work completed 100% on time.

The unfortunate result for you of this increased system capacity is that we no longer feel that it is necessary to use GRASP on our second CPU. Secondly, we would like you to adjust our monthly billing rate to reflect this. Please be assured that if this situation changes in the future, we will promptly notify you.

Yours truly,



Wayne Beardsley

WB/ap

... But we've published this one to show you the kind of results GRASP produces. What took two 360/50's to accomplish under DOS/POWER is now being done by just one 360/50 with DOS/GRASP II. If you use DOS, or are planning the use of DOS or DOS/VS, you should know all about GRASP.

GRASP FEATURES

- * Automation Wraparound Spooling
- * Complete Job Accounting
- * User Program Self-Relocatability
- * Partition Priority Balancing
- * Remote Batch Terminal Support
- * 4th DOS Partition
- * Resident Transit Area
- * Automatic Volume Recognition
- * Cataloged Procedures
- * PCI Fetch
- * Tape Spooling Support
- ... And Many Many More

Call or Write for Further Information

Please send information on GRASP to:

Name _____

Company _____

Address _____

City, State _____

Telephone _____

We have a 360/370 Model _____



SOFTWARE DESIGN, INC.
872 HINCKLEY ROAD
BURLINGAME, CALIFORNIA 94010
TELEPHONE: (415) 697-3660

On Designing Supercomputers

Careful Algorithm Analysis Can Mean Better Machines

By a CW Staff Writer

ANAHEIM, Calif. — Computer designers "could produce computers which are much more effective than present machines" by doing careful analysis of users' algorithms, David Kuck of the University of Illinois told an FJCC session on "Supercomputers."

By designing such supercomputers with the user's problems and operating procedures clearly in mind, the computer designer could build systems that were the biggest and fastest and most complex available and at the same time make them useable by ordinary users without extensive hardware and software backgrounds, Kuck indicated.

"It is also the designer's responsibility to consider new uses for machines, particularly in the non-numerical file-processing area," Kuck said, indicating this would "make the benefits of supercomputers more directly available to ordi-

nary users."

Kuck said that even though many designers will push one configuration or method of operation as the "best way" to design all systems, "clearly there are many different computer/software configurations extant which serve quite different sets of users in reasonably acceptable ways."

Software Layers

The problems with today's system, Kuck indicated, include "too many layers of software being used in an attempt to make general-purpose computers appear as a variety of special-purpose machines."

"If steps were taken to automate the design of entire computer systems," he added, "then it should be possible to incorporate these users' needs by analysis of algorithms they wish to run."

To reach the ideal goal, Kuck outlined what he felt were the computer designer's

goals and responsibilities.

These included a reduction in the use of high-cost components and subsystems in a machine while increasing the use of low-cost components and maximizing the data flow rates throughout a system by introducing concurrency into the designs.

In addition, Kuck said designers should measure user algorithms to determine system design and make all machines "extensible in their capabilities."

Kuck also stated the designer of computer systems should "incorporate new processing features into hardware to replace programs," another move that would make super systems easy to use by the average potential user.

At the same time, Kuck admitted "it is very easy (and hence quite common) for university professors to go around waving their arms and pontificating about how things should be."

"Every sensible computer person

knows it is not such people who determine what machines will come into common use, but rather market forces which do."

Because of this, he said, "paper and real machines conceived in universities, by users, and even in the back rooms of computer manufacturing establishments, are ignored."

He also noted a trend toward consolidation in the mainframe area and suggested that if this trend continues, the result could actually be less innovation than is now evident.

To overcome this, he said, there was a need for active consumerism on the part of the people who design computer systems.

"Perhaps the knowledgeable current users can clarify their demands and make them felt. Maybe even the masses of potential ordinary users will realize what computers could mean to themselves and press for the commercial availability of such computer services."

But if these moves on the part of designers and users fail in getting production of better and more cost-effective systems, then innovation in the business will be held back for decades to come, he concluded.

Waiting for delivery of disk systems?

We can deliver in 30 days... at prices that will save you (literally) thousands of dollars per system.

If you've ordered a disk system recently, better check on delivery. You may want to consider what System Industries can immediately offer.

What we're proposing is not a sale, not a gimmick. We're simply offering our standard production units, the Series 3500 Removable Cartridge Disk Systems, at our standard prices. Ready to plug into a wide range of minis--DEC, Data General, Varian and others--these disk systems are available today, with their usual high levels of performance and reliability.

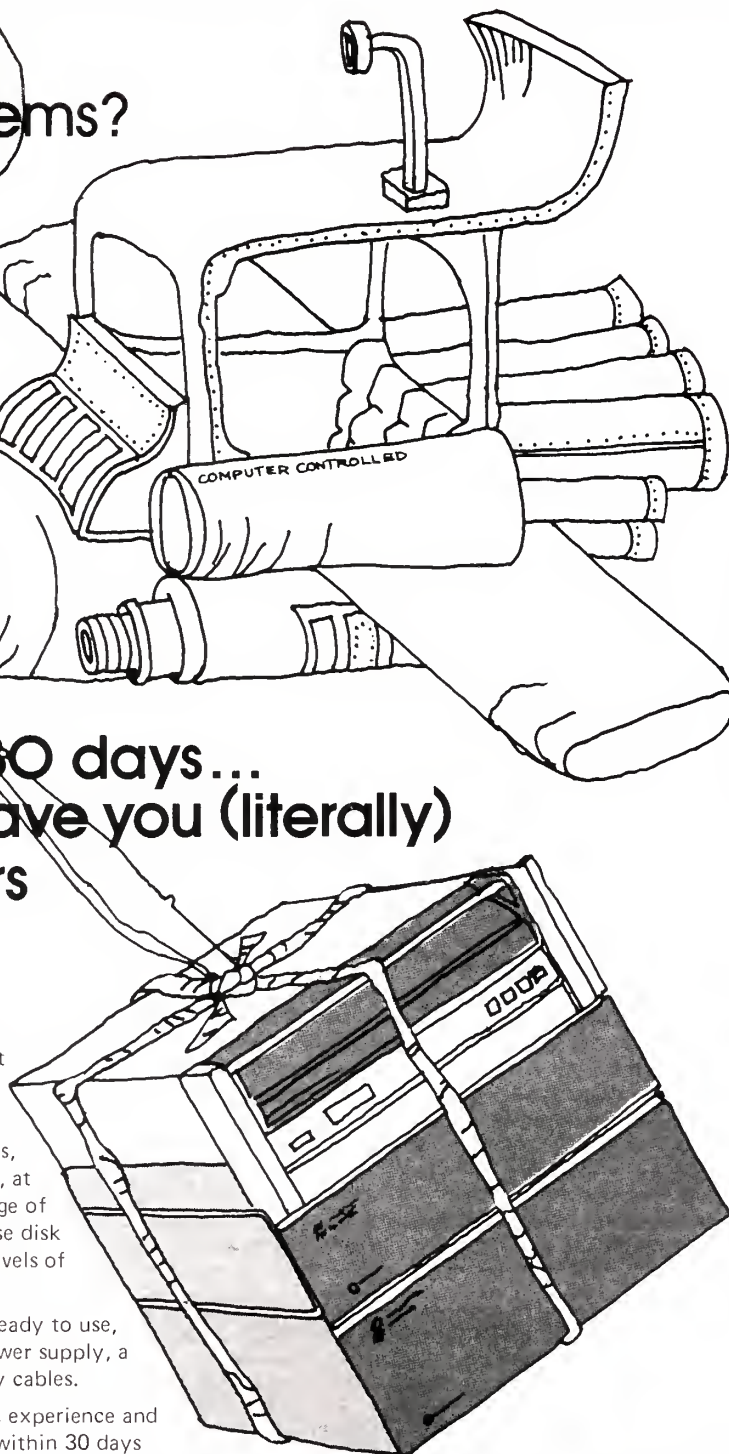
Here's what you get: A fully operational system, ready to use, which includes our proven 3010 Controller and power supply, a Diablo Model 30 Series Disk Drive and all necessary cables.

Here's when you get it: Because of our production experience and field proven system design, we can assure delivery within 30 days of your order. And we can do it at our standard prices--prices that may save you as much as \$3K per system. Or even more on a dual-drive system.

The quickest way to find out all the details about specs or prices is to pick up the phone and call Kent Winton at (408) 732-1650. Call collect if you wish, but call!

System Industries

535 Del Rey Avenue
Sunnyvale, California 94086



Dear Mr. Winton

Date

I'd like more information about your Diablo Disk Systems for DEC minis. Please provide the following

- ☐ Phone at once with specs and prices, my number is _____
☐ Have your nearest rep contact us at once.
☐ Send descriptive literature, my minicomputer is _____

Name _____ Title _____
 Company _____
 Address _____
 City _____ State _____ ZIP _____

Simulation or Math Modeling? Perhaps A Mix Is the Best

By Edward J. Bride
Of the CW Staff

ANAHEIM — Why simulation?

Computer designers, engineers and users held a two-hour debate on the merits of simulation vs. mathematical modeling at the FJCC, but the results were inconclusive.

Simulation provides a good way to predict a system's performance, most agreed, although a mix of simulation and mathematical modeling was recommended.

Thomas E. Bell of the Rand Corp. noted simulation does help predict when poor response will be introduced into a system, such as when too many I/O devices are added. It can also predict such things as message delays, lost data or the unresponsiveness of a system.

On the other hand, Alfred DeCegama advocated the use of mathematical models where more than four programs were being processed simultaneously. The NCR engineer suggested mathematical models are much faster than simulation, although he did concede that simulation is cheaper and faster to develop.

Anyone interested in predicting system performance, he noted, should assess just how many times the measurement would be needed, and then choose — most likely — a mix of simulation and mathematical modeling as the more efficient approach.

While the audience was divided on which approach was better, session moderator Philip J. Kiviat, who is with the federal ADP Simulation Center, noted models can use feedback from measurement devices, whereas simulation can not.

People interested in simulation can help in systems design, Kiviat commented, noting these people cannot help control systems through the method they advocate.

"We must close the loop," he said, "by taking measurements, and using them to control the system."

"Simulation is not useful here, but measurement can be used to feed back to mathematical models," he proposed.

Bell said that if simulation is chosen, then users must adhere to a set of rules headed by stating objectives of the simulation project — in writing. Then, consistency must be checked before design is continued.

Codasyl Ponders 'Associate' Members

Lease price for the time-sharing operating system from DTSS Inc., Hanover, N.H., [CW, Nov. 15], is \$7,500/mo. Prices in the original story covered both minimal hardware and the DTSS software.

Another program produces as many as 2,000 pseudo-random numbers. Again the authors point to the value of this for their chosen field but various business DP operations can also use random numbers.

Since the net provides access to a common data base for each user, the Edit and Tedit facilities appear to allow programs to be developed jointly by workers even though not physically located in the same city together.

Name _____
 Title _____
 Company _____
 Address _____ ZIP _____
 Telephone _____



envelopes and business forms go together naturally...

Of all national suppliers, only Curtis 1000 offers you both business forms and a full line of envelopes.

Your local Curtis One Thousander is a business forms specialist and an envelope specialist. So he can be twice as valuable when he calls!

He offers standard and custom business forms and envelopes. Also uniquely special business forms and envelopes and combinations —time and money savers available only from Curtis 1000!

Ask your Curtis One Thousander for samples, information, ideas! (We support our 326 salesmen from facilities in every region —from border to border and from the Rockies to the Atlantic.)

Or write to Jack Holloman, Vice President-Marketing, Curtis 1000 (Ref. CW-10), 1000 Curtis Dr., Smyrna, Ga. 30080.

...but only Curtis 1000 offers you both

Interest Reports Merged; Forms, Print Time Saved

COLUMBIA, Md. — Production of year-end federal and state forms has been simplified for 360-based bank DP centers handling savings accounting applications, with the combined Interest Reporting System (IRS) software from the Disc Division of Hittman Associates Inc.

The system is said to meet the latest reporting requirements of the Internal Revenue Service while eliminating redundant paperwork. It reports all related accounts on a single 1099 or 1087 form, but provides enough detail about each account so the customer can separate the data for his own tax-reporting purposes, the company said.

The system extracts interest and account information from a wide variety of user record formats, without requiring any sort of conversion run.

The data is brought together on a single new file used directly to produce the multi-account 1099 or 1087 forms, but which is also then available as an in-

quiry or reporting data base in its own right.

Tapes Generated

In addition to reducing the number of individual forms to be prepared, the software also generates tapes to Internal Revenue Service and state tax agency standards, and provides the bank itself with interest reports by branch and by type of account.

Said to handle the entire process from reading and analysis of the diverse input files to printing of the 1099 and 1087 forms in a single pass, the software is currently operational in an OS/360 environment, in an 80K to 120K partition.

Written largely in Cobol, it is being adapted to DOS/360, where it is expected to function in 64K, and to Burroughs B3500 configurations.

The package sells for \$7,500 including source code and installation support, and can be ordered from Disc at 9190 Red Branch Road, 21045.

Accounts Run in T/S Mode

CHICAGO — Midwestern firms anticipating a need for DP capabilities, but fearing the cost of in-house installations, can get four primary accounting functions handled through the Remote Computing/Billing, Accounts Receivable, Sales Analysis and Inventory Control (RC/Basic) services of ISC/Pryor Computer.

In the billing operation, RC/Basic edits input data and computes all pricing, including extensions of unit prices and the application of various discounts, and sales taxes as appropriate.

The accounts receivable provides monthly statements that show balance forward, current month's detailed activity, payments received, service charges and balance due.

The statements indicate aged amounts past due, through 30-,

60- and 90-days. The same data is summarized by account on a report for management.

The sales analysis is particularly useful to distributors, ISC/Pryor said, since it can show monthly sales by manufacturer and location. Sales lost reports and 12-month sales histories by item and location are also generated by the system.

The inventory control system supports users inquiry so decisions can be made based on current information.

There is a "fitting charge" to adapt the standard RC/Basic programs to a user's needs, and this one-time cost may vary from \$500 to \$3,000. Beyond that, the user is charged only for the time he uses the system.

ISC/Pryor Computer is at 400 N. Michigan Ave., 60611.

No Empty Promises!

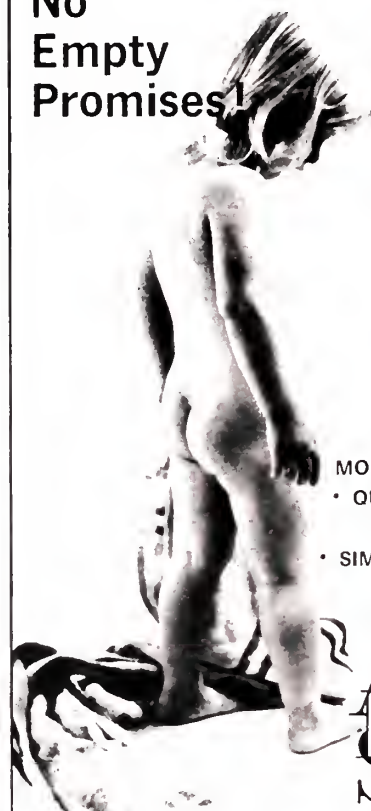
Just Bare Facts!

Our TELECOMMUNICATION MONITOR "BOSS"

can satisfy your on-line needs better, because it provides

MORE FEATURES • SENSIBLE PRICE
• QUALITY • GREATER VERSATILITY
• IMPLEMENTATION EASE
• SIMPLE APPLICATION INTERFACING
• EXPANSION CAPABILITY

AUTOMATED FINANCIAL SYSTEMS, INC.
ONE DECKER SQUARE
BALA CYNWYD, PA. 19004
(215) 667-1000



Data Briefs

Terminal Interface Samples Up to 128 Analog Inputs

IRVINE, Calif. — The SRC Division of Moxon Inc. has an Astroverter data terminal interface to convert analog information into RS 232-compatible serial Ascii code.

The interface can sample outputs from up to 128 channels of analog data and generate a digital output compatible with mag tape systems, TTYs and data sets, the company said.

The system includes up to five plug-in circuit cards. Remote control and time code insertion features are optional. The basic system, which can operate at switch-selectable speeds of 110, 115, or 300/bit sec, costs \$770. Moxon is at 2222 Michelson Drive, 92664.

Plotter Handles Terminals

LAYFAYETTE, Calif. — Zeta Research Corp. has introduced a remote digital plotter that can operate at 810 step/sec.

The System 3630 plotter interfaces with remote terminals operating at 10, 14.8, 15 and 30 char./sec, and it includes a 34-in. drum which uses conventional roll-fed plotting paper. Total plotting area equals 34 in. by 120 ft, the company said.

The 3630 is supported by compatible software for major time-sharing services and CPUs and it includes EIA RS 232-compatible interface software. The 3630 costs start at \$17,500. Zeta is at 1034 Stuart St., 94549.

NCR Adds Tape Unit

DAYTON, Ohio — NCR has introduced a paper tape transmitting unit which contains a built-in modem. Designed to handle any 5- to 8-bit data code, the 760-328 can transmit at 72 char./sec over dial-up lines.

The paper tape transmitter costs \$1,675 or \$70/mo. An associated paper tape reeler with an increased paper capacity of 1,500 ft sells for \$165 or \$28/mo, the company said.

CPI Builds Texas Net

DALLAS — Communications Properties Inc. will soon begin construction of a 775-mile microwave system connecting seven cities in Texas.

Designed to handle data communications and other types of transmissions, the net will include 31 microwave sites connecting Dallas, Austin, San Antonio, Corpus Christi, Houston, and Beaumont. The company is one of the specialized common carriers which will provide selected services to data and other users.

Channels Next Year?

Canadian Satellite Could Serve U.S.

By Ronald A. Frank
Of the CW Staff

OTTAWA, Ontario, Canada — U.S. communications users might be using domestic satellite channels by the middle of 1973, if current Canadian plans materialize.

Canada's first domestic satellite, Anik 1, was successfully launched on Nov. 9 and will begin service to Canadian users in January. The Anik 1 orbit also covers the northern two-thirds of the U.S. and could provide service to U.S. users.

The Canadian satellite, though launched from Cape Kennedy by the National Aeronautics and Space Administration, is controlled by Telesat which is jointly owned

by the Canadian Government and the country's common carriers.

At present the company is chartered to provide services only within Canada. But the necessary "revised letters patent" has been filed with Parliament, which if ratified will allow non-Canadian use of Telesat facilities.

If Telesat gets Canadian Government approval, by the spring of 1973, as expected by Canadian sources, additional authorizations would have to be given by the Federal Communications Commission. Domestic U.S. service using Anik 1 would depend on the construction of U.S. Earth stations.

Domestic satellite system applications, presently pending before the FCC, include ground stations which could be built and used temporarily until a domestic satellite is launched and in service, according to a U.S. Government source.

One satellite consultant estimated the necessary ground stations could be built in three to six months at a cost of \$100,000 to \$250,000 each. The Anik "beam" probably could serve U.S. customers from the Canadian border southward to a line running roughly from San Francisco to just north of Washington, D.C.

Pending a change in Telesat's authority by Canada's Parliament, it is not known exactly how U.S. users would access Anik 1 channels. But officials in both countries seem to favor bringing the satellite channels to U.S. common carriers who in turn would supply them to their customers.

Rates and facilities for Earth stations on Anik 1 would have to be decided between Telesat and the U.S. common carriers.

The satellite channels would probably serve data as well as other users, according to one FCC source. But exact allocation of available satellite facilities would probably be determined by the U.S. common carriers, he said.

Digital Met in 1973

If all-digital facilities were provided between user's sites and the satellite ground stations, data users could have a digital network operating next year, the satellite consultant said. U.S. carriers have not yet commented on the use of Canadian satellite channels.

With FCC approval, the first U.S. satellite system could be in operation by January 1975, the consultant estimated.

Both U.S. and Canadian authorities noted U.S. use of the Anik 1 facilities will be strictly an interim step to provide U.S. channels until a domestic satellite is available.

Letters approving the satellite usage in principle have been exchanged between the State Department and the Canadian Government, a U.S. source said.

Regulatory Processes Demand Public Confidence, DeButts Claims

NEW YORK — For most Americans, the functions of regulatory agencies "are a mystery wrapped in an enigma," according to John D. deButts, AT&T's chairman of the board.

Speaking at a recent meeting of the Economic Club, deButts said, "Only with public understanding of the issues and public confidence in the process by which the issues are resolved can regulation gain the public consent."

"What is needed is a climate of public opinion that is not dominated by a few individuals or activist groups with their own axes to grind."

Telephone rates are rising "somewhat faster than the Consumer Price Index," deButts said. "We couldn't have chosen a worse time for this to happen," he added, citing public impatience with rising prices and a "national policy to halt inflation."

The telephone companies have been

"traditionally disinclined to try our rate cases in the press," to avoid influencing the regulatory process, deButts said. But at the same time the phone companies should not "neglect to inform the public of its stake in these matters," he said.

Press coverage of regulatory matters with few exceptions has been sporadic and superficial, deButts claimed. One of the consequences is that "the public is very largely unaware of how significantly the regulatory process may be influenced by [regulatory] agencies' staff employees." The regulatory staff members, after "acting as adversaries in the hearing room," are then called upon to "assist in writing the decision," deButts said.

"If there is a conspiracy that shields the regulatory process from public view, it is not a conspiracy of secrecy," deButts said, "rather it is a conspiracy of complexity."

Regulatory decisions that are declared to be in the public interest are made without the benefit of public opinion, deButts charged. "It is the public who will bear the consequences of these decisions and it is the public who will pay the price," deButts said.

Raytheon Display Has IBM Emulators

NORWOOD, Mass. — Raytheon Data Systems has a programmable CRT terminal system that includes features available with IBM 2260 and 3270 systems.

The PTS-100 CRT system can interface with IBM 360/370s and includes as standard features a tab capability, printer support and non-destructive cursor.

For use in local mode or through communications lines, the CRT has an MOS memory that is expandable from 8K to 64K bytes. The display is available with 480, 960 or 1,920-character screen capacities with 67- or 82-key keyboards.

The Raytheon emulator software for 2260 or 3270 operation includes user training and maintenance.

The PTS-100 costs about \$6,050 for a two-display system or about \$270/mo. The company is at 1415 Boston-Providence Tpke., 02062.

AT&T Files 208 Rate

WASHINGTON, D.C. — AT&T has filed an interstate tariff for its 208 data set which operates at 4,800 bit/sec. The proposed charges would cost users \$125/mo with an installation fee of \$150. The tariff, if approved by the FCC, would take effect Dec. 24.

The proposed interstate monthly rate for the 208 is \$14 more than the highest intrastate rate now being charged by Bell operating companies. Usually Bell interstate rates are lower than intrastate charges, one source said. Seven states have already set rates for the 208, according to an AT&T

spokesman, with the highest charges applied to Illinois users. In that state the modem costs \$111/mo with an installation fee of \$150, the spokesman said.

In South Carolina, Iowa, Minnesota and Wisconsin local phone companies have set \$100 for the monthly rate and a \$100 installation charge. In Michigan the monthly charge is \$105 while installation is only \$25, the AT&T spokesman said. In California the rate is \$100/mo with an installation charge of \$150, AT&T said.

Now...get both in one... a batch terminal and a time sharing terminal.

Our Sycor Model 340 can perform both functions... easily and economically! This represents another first in data communications terminals from Sycor!

No longer is it necessary for the batch terminal user who has a need to access a local time sharing system to maintain a simple, low-speed terminal just for this purpose in the same office. Sycor now has eliminated this expense by adding low speed (100-300 baud) asynchronous communications capability to its Model 340. A Sycor 340 user can access any major time sharing system, input the problem,

receive the solution, and then continue with the data entry operation.

In addition to this unique dual communications capability, Sycor provides users with T.A.L., a programming language developed specially for data entry applications. A wide choice of peripherals also is available—printers ranging in speed from 30 cps to 200 lpm, 7 or 9 track magnetic tape drives, and a 250 cpm card reader.

To get started getting both in one, call or write today for our colorful, informative brochure on the versatile Model 340.

The Sycor 340 Intelligent Communications Terminal.



S
SYCOR INC
100 Phoenix Drive
Ann Arbor,
Michigan 48104
(313) 971-0900

**GENERAL
AUTOMATION
SAYS
BUY DEC**

If you're shopping the minicomputer market for raw hardware at rock bottom cost, it's hard to know where to stop. With more than two dozen price lists to choose from, it can get confusing. And time consuming.

We're here to make it easy for you. Buy DEC.

When you cut through all the claims, DEC's priced as low as anyone else. And they have built a business fulfilling the needs of the low-end iron buyer.

We make low cost hardware too. And if you're price shopping, you'll find us competitive. But raw iron is not our primary business.

The cheapest machine vs. the cheapest solution:

Sure, our goal is to save you money too. But our long suit is squeezing these savings out of your total systems cost rather than off of our price list. So if you need more from the machine or the company that sells it to you, we recommend us. General Automation.

Take *the world's most powerful minicomputer*, for instance.

The General Automation SPC-16.

The SPC-16 possesses the most powerful instruction set you can buy in a minicomputer today. Think about that. The *most* powerful. As a result, the SPC-16 does more things in less time. It will actually reduce the total cost of your system.

Depending on your specific needs, you can choose from six different models in the SPC-16 family. Each backed by the best software and peripheral capability in the business. There's another very important reason why you should buy from us.

It's called involvement.

All the other big mini manufacturers

today are touting the fact that they're "end-user oriented" or that they're now "in the systems business."

We've been doing exactly that for more than five years now. And it's nice to see that others have begun to recognize our leadership.

We learned a long time ago that the only way to really help our customers in solving their systems problems was to fully understand those problems.

So we got involved with our customers. Both end-users and OEMs. Listened attentively. Learned a lot. Got answers. And wound up building systems to solve some very tough, very complex problems.

Emissions analysis and electrical test systems for the nation's largest automobile manufacturers.

Production machine control systems for some of the biggest companies in the machine tool business.

Telecommunications and message switching systems for the world's leading communications companies, to name just a few.

In short, we've built our company and our reputation by offering answers, not just iron.

Who's it gonna be?

Actually, we've made your choice fairly simple.

If all you need is raw minicomputer hardware at a "rock bottom" price, we recommend DEC.

If you'd like something more—from a mini with more oomph to the total solution of a complex systems problem—we recommend us.

General Automation.

Our phone number is (714) 778-4800.

Or write:

1055 South East St., Anaheim, Calif. 92805

General Automation

New! 1401 SIMULATOR "SIM 14"™

NOW AVAILABLE FOR 360-50-65
USERS

- EXECUTES UNDER BOTH DOS & OS
- SUPPORTS 1401 UNIT RECORD, TAPE AND DISC DEVICES
- JCL AND FILE COMPATIBLE WITH CS30-40
- SELF RELOCATING FOR MULTIPLE PARTITION EXECUTION
- THRUPUT SPEEDS EQUAL TO CS40
- PROVEN PRODUCT BY CUSTOMER USE
- TAKE ADVANTAGE OF 360-50-65 LEASE PRICES WITHOUT HAVING TO REPROGRAM ANY 1401 PROGRAMS

Call or Write

DEARBORN COMPUTER LEASING CORPORATION
Subsidiary of Dearborn-Storm Corporation
4849 No. SCOTT, SCHILLER PARK, ILLINOIS 60176 312 671-4410

Data Users Spend 50% on Lines

NEW YORK — The average data communications user spends 50% of his budget on lines, 35% on hardware and 15% on his staff and overhead, according to a recent study by the Diebold Group Inc.

Data communications will become more integrated into the total business area and the DP executive will have to consider voice, data and message planning, the report said. At present, data communications represents about 8% of the DP budget for average users, the report said.

The Diebold Research Program study of more than 200 of the largest U.S. corporations showed

that firms are expanding their DP technologies "to physically remote portions of a company's operations." While up to now data communications has been used primarily to transmit information to top management, it is also becoming more "interactive to increase worker productivity."

Communications growth will expand rather than explode within the next three years for most users, the report predicted.

Since data communications networks support business activity, management must be involved in the communications decision-making process, the

study noted.

Many users find implementation of a communications system difficult. In addition to regulatory considerations, users have trouble designing their systems and selecting their suppliers, the study added.

Users should select terminals according to their functions, the report advised, adding that users should not alter their system objectives to suit particular equipment. Independent suppliers of terminals, multiplexers, concentrators and similar equipment can provide "superior cost-effectiveness compared to main-frame vendors' products."

In configuring a network, users should also utilize "automated analytical tools" to evaluate alternatives and optimize their networks. Diebold is at 430 Park Ave., 10022.

Setting Standards

Vermont Research

in Memories

The Standard

1000 Series

Over 2000 delivered since introduction in 1968

The standard for head per track memories as set by Vermont Research
1100 bits per inch
8.7ms average access
2 megacycle data rate
and a range of products to choose from

The New Standard

3000 Series

Newest electronics
Newest magnetics
Newest mechanics
The best in performance and reliability.
The new standard for head per track memories is again set by Vermont Research.
2200 bits per inch
8.7ms average access
4 megacycle data rate
and a range of products to choose from

5000 Series

A moving head memory with a conservative Vermont Research specification Surely the standard of moving head devices.
400 tracks per inch
4000 bits per inch
35ms average access
6 megacycle data rate
40 megabyte capacity
and a range of products to choose from

Whether it is disc or drum — whether it is head per track or moving head — whether it is digital interface or complete memory system, you should call us at Vermont Research to review your requirements for rotating memories

Vermont Research Corporation
Precision Park
North Springfield
Vermont 05150
Telephone: 802-886-2256
Telex: 710-363-6533

VRC Inc.
5261 West Imperial Hwy
Los Angeles
California 90045
Telephone: 213-641-7100

Vermont Research Limited
Cleeve Road
Leatherhead
Surrey
Tel: Leatherhead 74758
Telex: 23280

2750 PBX Unit Installed

MECHANICSBURG, Pa. — IBM has installed one of its 2750 computerized PBX systems at the field-engineering distributing center here. The system is available only through World Trade, outside of the U.S. The 2750 "was installed as part of the evaluation of the product" and it is not unusual for IBM to take advantage of products available within the corporation, an IBM spokesman said.

**for
sale
or
lease**

All 360 Systems and I/O
Equipment at savings of

50%
TO
70%

We will purchase any 360
equipment available for im-
mediate or future delivery.

Please
contact: **Bernard Gest**

**COMPUTER
MARKETING
INC.**

7704 Seminole Ave.
Melrose Park, Pa. 19126

Call (215) 635-6112

System/370 Operating Leases
3-5 Years
Substantial Savings
FREE "Computer Marketline"
Bulletin



“Me, too,” they’re not.

Go MDS instead of IBM 3410/11, and you’re in for more than 10% dollar savings.

Which announces our 8410/11 tape.

You’ll get higher drive speed for greater throughput, model for model, across the board. Your choice from MDS is 25, 50 and 75 ips, instead of 12½, 25 or 50 ips.

What’s more, you get eight-drive capacity per subsystem instead of six. Plus automatic thread instead of manual. Plus cartridge option instead of no option. Plus 33 to 50% faster rewind times. Plug compatible with both 360 and 370, of course.

Meanwhile, if you need performance in a higher or lower range, we’ve got that too. And disk systems. And printers.

We also have the service that helped make us the peripheral power. Today, we have over 2,000 men in the field, who have earned us the second largest customer list in the industry.

Questions? Good. Call our nearest sales office or call headquarters at (315) 792-2038.

Mohawk Data Sciences Corp., World Headquarters, Utica, N.Y. 13503.

MDS

The Peripheral Power

GE's new Mark III can cut your time-sharing costs by a third

What we're offering is not a miracle, but a new approach to information processing: Mark III. It's a single, unified service that combines the response of interactive time-sharing, the economy of remote batch processing, and the reach of a worldwide communications network.

Your total savings depend on your own applications, but our estimate of one-third may be conservative. For example, with Mark III you can save one-half or more of your processing costs just by moving your time-sharing programs into remote batch operation. In addition, Mark III includes new time-sharing capabilities that can lower your costs dramatically. To tie it all together, a new budget allocation and control system helps you get the most out of each computing dollar.

General Electric introduced the first time-sharing service in 1965. In 1970, GE established the first

international information processing network linking over 250 locations in North America and Europe.

And now Mark III — an integrated network of nearly 100 interconnected computers. With a network this size, each computer performs that task for which it's best suited — communications, interactive time-sharing, or batch processing. The result is a service that can tackle your computing needs easily, reliably . . . and, most important, economically.

If you're a Mark II user, Mark III offers major new features and is fully compatible. If you're not, it's time to make a serious comparison of Mark III with whatever information service you now use. Phone 800-638-0971 or write us at 7735 Old Georgetown Rd., Bethesda, Md., 20014. We're ready to help.

291-83A

GENERAL  **ELECTRIC**

**WORLD LEADER
IN INFORMATION
SERVICES**

Bits & Pieces

\$1,995 Matrix Printer Operates at 100 Char./Sec

HUDSON, N.H. — An 80 char./line matrix impact printer, operating at 100 char./sec and 60 full line/min is available from Centronics Data Computer Corp. for \$1,995.

The Model 306 uses a 5 by 7 dot matrix and can produce up to four carbon copies, the firm said.

Various character sets are available and can be expanded up to 128 characters as an option. This feature allows output to be printed in up to 17 different languages, the firm said.

User applications include hard copy output, time-sharing use and communications applications. Delivery is 30 days from One Wall St., 03051.

Source Record Punch Performs Simultaneous Operations

DAYTON, Ohio — The Model 1740 Source Record Punch (SRP) can be programmed to receive and organize information at the same time it is preparing printed or punched output, according to Standard Register Co.

The Model 1740 can accept information from various sources including its keyboard and internal slide switches.

The units are priced at \$4,150, or \$175 on a monthly rental basis with an option to buy from the firm at 626 Albany St., 45408.

Industrial Control Mini Offered

PRINCETON, N.J. — A \$30,000 mini-computer and software system designed for industrial control operations is available from Metromation, Inc.

The Basic Control System (BCS) hardware includes a CPU with core memory, process I/O, teletypewriter and console. The system is available in either core only or core-disk configuration, the firm stated.

A system with 16K words of core storage and 1.2M word disk sells for around \$50,000; an all-core system with 16K word capacity sells for around \$30,000.

In operation, the BCS controls real-time input devices using a multiprogramming monitor and a Basic language interpreter.

The firm is at 1101 State Road, 08540.

Add-Ons Available to Sigma Users

VAN NUYS, Calif. — Sigma 5 and 7 users can buy an add-on semiconductor memory system from Signal Galaxies Inc.

The Model SG-5/7 is fully hardware and software compatible and cables directly to the Sigma memory bus, the firm stated.

Operating cycle time is said to be 650 to 750 nsec, depending on mode of operation.

Field expansion is possible through plug-in memory cards in 4K increments up to 16K, and all units come with an off-line simulator test system. Each memory bank may be expanded with up to 16 ports.

The basic 4K system costs \$16,000 and a full 16K memory bank sells for \$25,000. All units carry a one-year warranty from 6955 Havenhurst Ave., 91406.

Debug Unit Made for PDP/8 Users

PISCATAWAY, N.J. — PDP-8/E users can debug programs by halting execution at selected memory locations with the CIS 110A Hardware Breakpoint Module from Computer Interface Systems, Inc.

The unit consists of a switch panel assembly, cable-connected to a printed circuit board which plugs directly into any Omnibus slot.

The \$485 module is available through Box 58, 08854.

Users Can Write Their Own Microprograms

LONDON, England — Recent advances in microprogramming techniques allow the user of a Hewlett-Packard 2100 minicomputer — or any similarly designed machine — to tailor new instructions for his CPU, according to John Page, senior systems analyst for Hewlett-Packard.

In operation, this means the user can extend a minicomputer's instruction set to include commands specifically designed for applications that were previously beyond the machine's limit, he stated.

Microprogrammed computers — such as the 2100 — differ from conventional hardwired machines in that the CPU references a "control memory" which stores a sequence of low-level hardware instructions, Page said.

The control memory contains a set of microprogrammed instructions for every command in the CPU's basic instruction set. It performs each instruction by locating the specified

microprogram, and executing it as though it were a small program. When the microprogram is finished, the CPU is signaled to execute the next command, he explained.

Within each microprogram the individual steps are very elementary: they can cause a number to be moved from one register to another or place specified signals on a bus. But by combining individual statements the user can create complex operations such as looping, branching and testing, he said.

A properly designed minicomputer will not need a lot of space in its control store to contain microinstructions. The HP 2100 contains only 256 words of read-only control memory (ROM) for the entire instruction set, Page stated.

Page explained the procedure for creating microprograms on the HP 2100:

- Write the program on coding forms using a defined logic.

- Record the coded program on some input media.

- Process the tape on the mini by using a microassembler that comes with the computer. This process is analogous to a normal machine code assembly, in that a machine intelligible program is produced from a human-oriented symbolic origin.

- Feed the finished microprogram into the CPU's ROM control store using the software supplied with the computer.

- Program execution is performed in the same manner as before, except that when the machine executes one of the new commands it will reference the user created microprogramming in the control store.

To provide space for users to enter their own microcodes, a Writable Control Store (WCS) memory is provided that functionally acts the same as the ROM but can be written upon or changed by the user.

Report Urges:

Study Units, Internal Needs, Then Buy

By Michael Weinstein
Of the CW Staff

MOORESTOWN, N.J. — IBM's recent announcement of a "low-cost" Optical Character Recognition (OCR) reader [CW, Nov. 1] may lead many more users to consider this a valid technique to speed up data entry.

But before they rush out and buy they should do their homework on the types of units available and perform an internal study of the format of their data, according to a Datapro Research special report.

There are basically three types of OCR

All About OCR

units available: mark-sense readers, bar-code readers and character readers, the report stated.

Mark-sense units are the simplest. They interpret rows of hand written marks in much the same manner as conventional readers read the holes in punched cards. The mark sense technique is usually limited to inputting numeric data, however, since the preparation of alphabetic input would require the person marking the card to memorize the Hollerith code.

Applications for mark sense units have traditionally been test scoring, questionnaire reports, input from meters, etc.

Bar code readers can read both numeric and alphabetic information. One difficulty in using these units, however, is that information to be read by the unit is printed in a form that is hard for a person

to read and almost impossible to duplicate by hand, the report noted.

An example of a specialized font used by bar code units is the code used on personal checks to identify the account number.

The character recognition units that read standard letters and numbers are the most elite and the most expensive of the OCR devices.

Most character recognition devices read from preset type fonts — the most common are OCR-A and OCR-B. Selectric typewriters with interchangeable fonts can be used for input preparation.

The greatest drawback of character recognition units, according to Datapro, is the cost and the "white tire syndrome": users get carried away with a machine that has all sorts of neat features that they don't really need.

To determine what type of OCR unit they need, users are advised to break input into three areas: data input to application programs, programming input and correction input. By first understanding the form of the input, the user can easily avoid units that he does not need, the report continued.

Applications data represents the largest volume of input work for the typical shop and generally is in the form of a large number of records, each in a simple and repeatable format.

Various manufacturers estimate that any installation having from seven to 12 keypunches can profitably make use of OCR equipment, the report said.

Programming input is more complex

and is characterized by low volume and the need to conform to a set language format.

Correction capabilities depend on the form of the original input but generally are more complex. The unreadable character must be displayed but this character must also be shown in context to surrounding information.

The full report — "All About Optical Reading" — describes the recognition capabilities, document specifications, output media, error control features, performance, pricing, availability status and applications of 74 OCR readers with price tags from \$1,235 to \$1 million.

Copies are available for \$10 from One Corporate Center, Route 38, 08057.

IM-Byte Add-On Replaces IBM 360 Mainframe Memory

MARINA DEL REY, Calif. — A IM byte replacement memory for IBM 360 65, 67 and 75 users who want to enlarge mainframe memory is available from Ampex Corp.

The Ampex Mainframe-FCM memory is divided into two sections: IM bytes of core memory and 32K bytes semiconductor cache memory.

Cycle time for the cache portion is 250 nsec which when operating with the core memory portion provides an overall cycle time of 750 nsec. This overall speed matches that of the IBM 2365 mainframe memory it replaces without software modification, an Ampex spokesman stated.

"A memory's overall cycle time is determined by a successful data access rate, called a hit ratio," the spokesman explained. "We expect an average hit ratio of at least 90% due to the large size of our cache. IBM uses an 8K byte cache for its 370/155 system and has experienced a hit ratio of 80%," Ampex claimed.

The IM byte Ampex add-on leases for \$8,000/mo on a two-year lease including full maintenance, and sells for \$250,000. Comparable mainframe memories from IBM and other suppliers lease for \$12,000 to \$36,000/mo and sell for \$500,000 to \$1.5 million, Ampex said.

Present users of Ampex ECMs can add the cache memory feature through modification of their existing memories.

Ampex is located at 13031 W. Jefferson Blvd., 90291.

Display Aids Tape Operators

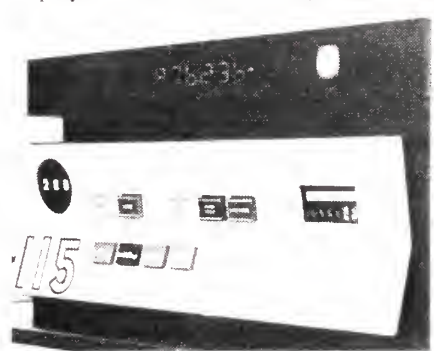
MOHAWK, N.Y. — The VSN-1 volume serial number display is mounted over remote tape drives to visually display mount messages to the operator.

The alphanumeric display unit from Advanced Digital Systems Inc. does not interface with the drive itself; electrical power and signals come from the central controller which interfaces with one or more CPUs, the firm stated.

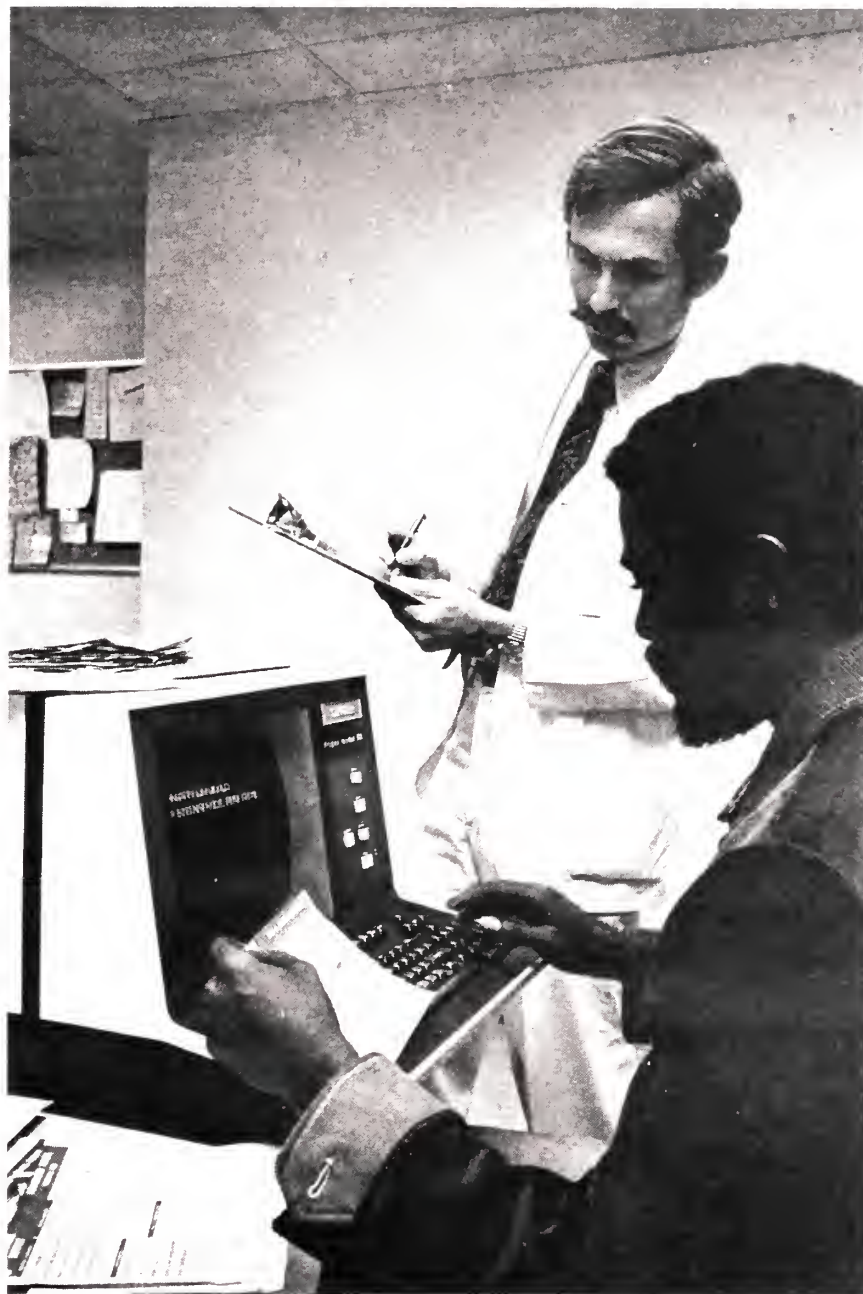
When a tape is to be mounted, the host CPU transmits tape identification information to the unit. This information is displayed to call the operator's attention to the waiting drive.

The unit is available for either a multiplex subchannel or a communications channel interface to the CPU. The controller operates off standard 110V 60Hz lines, ADS said.

Monthly rental for a typical 12 tape drive display system including controller and communications interface is \$19/disk from 146 W. Main St., 13407.



VSN-1 Display Unit



How Denver General Hospital took the emergency out of its replenishing procedures.

Denver General is a 350-bed hospital in Colorado's capital city.

Like most hospitals, it struggled with a 150-day inventory load that still couldn't eliminate expensive rush ordering.

Its accounting system could only account for about 75% of all items moving out of inventory. Which meant that somewhere along the line, 25% of proper patient charges weren't being made.

This year, Denver General installed SYSTEM TEN* computer by Singer.

Now, Denver General bills from its accounting process 100% of all inventory used.

The hospital is now working with a 30-day inventory, with virtually no rush-ordering.

Every ward and every service orders supplies through SYSTEM TEN. Files are constantly updated. The system prints out on a regular basis: balance on hand, current usage, year-to-date usage, year-to-date receipts, and

current receipts. A stock status report is printed monthly, but could be done daily if needed.

Once a week, purchase orders are generated from the system, with the ability to override orders in order to increase them, decrease them, or not order at all.

Soon, another SYSTEM TEN will take over the hospital's total accounting system, following patients from admission to discharge, tracking charges, preparing bills—even preparing the General Ledger. Together, the two systems will give Denver General an automated cost accounting system.

We can supply you with all the facts on SYSTEM TEN installations for many industries. Specific case histories that include hardware, software, configuration, sample forms, costs. Just contact your nearest Singer Business Machines representative. Or write: Singer Business Machines, San Leandro, California 94577.



**System Ten by
SINGER**

HOW TO RENT A MINICOMPUTER.

1 Just try to find one. Until now, rental companies and minicomputer companies just haven't been very interested. The mini business was built on purchase orders, and it's hard to break old habits.

Rental Electronics, Inc. thinks differently. Of course, that shouldn't surprise anyone. REI is number one in U.S. electronic equipment rental; we've gotten there by specializing in original ideas.

2 Pick the right machine. If you were buying a minicomputer, you'd look for a modern machine with the best price/performance on the market. If you rent or lease, you shouldn't have to settle for anything less. That's why REI went to Data General Corporation when we decided to get into the minicomputer business. The Data General Nova 1200 computer you rent/lease from REI is one of the most modern, popular, and reliable minicomputers available.

3 Pick the right configuration. Rental Electronics offers Nova 1200 computers with up to 32K 16-bit words of core memory, along with standard central processor options and interfaces for peripherals.

4 Think about the peripherals you need. We can supply any standard Nova 1200 peripheral, completely interfaced, and ready to run.

5 Get the software you need. A Nova 1200 from Rental Electronics comes with all the software you'd get if you bought the same machine from Data General. That includes standard things like assembler, editor, loader, debuggers, ALGOL, time-share BASIC, and FORTRAN.

6 Arrange for field service. REI offers full On-Call Service contracts... you pay a monthly charge and nothing more. Most important, the computer you rent from REI is serviced by the same Data General staff that has made a reputation as one of the best in the computer business.

7 Arrange the right terms. With a 3-year lease, an 8K Nova 1200 with Teletype (purchase price approximately \$9,800) costs less than \$250 a month; with a 1-year lease, it's less than \$335 a month. The same system, on a month-to-month basis, with maintenance, costs about \$784 a month. Or, under a rental-purchase agreement, it's \$980 a month, with 80% applied to purchase after 6 months.

8 Call us. We know you can't rent a complex piece of equipment from an ad. Call the nearest Rental Electronics office for more details. Lexington, Massachusetts (Corporate Headquarters), Tel. 617/862-6905 • Gaithersburg, Maryland, Tel. 301/948-0620 • Oakland, New Jersey, Tel. 201/337-3757 • Fort Lauderdale, Florida, Tel. 305/771-3500 • Rosemont, Illinois, Tel. 312/671-2464 • Dallas, Texas, Tel. 214/638-4180 • Palo Alto, California, Tel. 415/328-4525 • Anaheim, California, Tel. 714/879-0561 • Ontario, Canada (PLC Leasing Limited), Tel. 416/677-7513. Or call any Data General office.

9 Or Write. Send your name and address to "How to Rent a Minicomputer" Rental Electronics, Inc., 101 Hartwell Avenue, Lexington, Massachusetts 02173, and we'll send you our brochure with all the details. We're serious about minicomputers.



Rental Electronics, Inc.

A PEPSICO LEASING COMPANY

101 Hartwell Avenue
Lexington, Massachusetts 02173



Fabritek's booth lights up the hall with its OEM and end user lines of core memory planes, stacks and systems and extension core memories for 360s.



Mohawk Data Sciences concentrated on OEM exhibits, displaying its Model 2021 Cartridge Tape Drive, along with other tape drives, printers and card and tape handling products.



Attendees gather at Powertec's booth to view its line of AC-DC power supplies, DC regulators, inverters and switching power supplies.



Onlookers watch Decision Data's 96-column card punch in action. Decision also displayed other members of its 96-column card line, a data recorder, alphanumeric sorter, and a card reader.

'Lots of Industry Types Here'

160 Exhibitors in 410 Booths

In Quality, Quantity Joint May Be Best in 3 Years

By E. Drake Lundell Jr.
Of the Cw Staff

ANAHEIM — The last Joint Computer Conference may also have the distinction of being the best in the past three years.

This year's conference with 160 exhibitors in 410 booths was close to the best in terms of those figures since 1969 — when almost 1,000 booths were sold — and definitely reversed the downward trend evident in this area for the last three years.

Early attendance figures also appeared better than in recent years, with exhibitors happy not only about the numbers of attendees, but also with the quality of the average show-goer.

"For the past couple of years," one exhibitor said, "we have been getting a good quality of attendee, but the numbers have been bad. But this year it looks like we are getting both — good numbers and we're seeing the type of person we want to see at a show."

"There are lots of industry types here," another said, "and they seem to be from a higher level than in the past couple of years, and definitely of higher quality than the attendees who mobbed some of the shows back in the heyday of the JCCs."

The last Fall Joint, another long-time exhibitor said, "has the look and feel of some of the shows in the middle and late 1960s, say 1967 and 1968, or a little earlier.

"The problem," he said, "is that there were a few really flush years right after that and everybody began to expect the shows to always draw close to 40,000 and have 1,000 booths. So when the cutback came, everyone compared the size of the shows against those very big ones and not against the smaller ones that were more typical."

That the day of the big shows might really be back was also noted in the plans of the show's sponsor, the American Federation of Information Processing Societies, for the first National Computer Conference next June in New York.

Presently, Afips has space for about 750 booths, which would be a significant improvement over the past few years, and is guessing near 30,000 attendees.

This space would only occupy two floors of the mammoth coliseum; the Nippon East show has the other two floors, but is planning to use only one for its exhibit space.

Some sources noted that if the big shows are definitely back, Afips might possibly occupy the third floor of the coliseum, for a total close to the old 1,000-booth shows.

It is hard to tell now, but Afips has already booked 150 booths for the show and appears confident of selling out the 750, sources said.

Another sign pointing to the possibility of bigger shows once again was the number and diversity of new product introductions during this year's conference.

New products ranged from keyboards and other components to complete peripheral systems and there were more of these announcements than in the previous three years, several sources indicated.

Since the joints have always been considered by many firms as a forum for new product announcements, several sources indicated the rate of new product development might once again be picking up to a point that would justify larger shows.

"I really think it is a shame that Afips dropped the two-show-a-year idea just when it appears that the entire market is coming back. They shouldn't have been scared off by the recession which was bound to end," one long-time exhibitor added.

3330-Like Disk Units Get Interfaces

ANAHEIM — OEM buyers can now get the speed and capacity of IBM 3330-type disk drives with the introduction of two units designed for the non-IBM compatible market, while taking advantage of the 3330-like technology.

Ampex and the Remex unit of Ex-Cell-O Corp. both introduced devices at the FJCC designed with interfaces for non-IBM equipment.

The unit gives manufacturers "more freedom" in designing disk drives into their systems, according to Eugene Prince, vice-president and general manager for the Ampex Computer Products Division.

"The OEM often has had to use unnecessarily complicated IBM-type interfaces even though such complexity was not needed in his system," Prince said.

The interface, he said, is highly simplified between the disk drive and the controller and the unit in operation has a 28-msec average access time compared with the 30-msec average access on the IBM 3330 due to the use of voice coil positioners. The start/stop time is 15 sec opposed to the IBM time of 40 sec, he

added.

The Remex unit does not duplicate the 3330, but uses much of the same technology to produce a 300 M-byte memory in comparison to the 800 M-byte IBM unit.

The Ampex DM-330 is priced between \$16,000 and \$25,000 depending on configuration and quantity, according to Prince.

The Remex 3320 disk system is available in four field-expandable models including the 3320-1, a 75 M-bit configuration, the 3320-2 with 150 M-bit capacity, the 3320-3 with 225M bits and the 3320-4 with 300M bits.

The units feature a track density of 164 track/in., and a high-speed voice coil actuator with a built-in optical-sensing system.

The average head-positioning time is 30 msec, the firm said, and the average rotational latency of the unit is 8.3 msec with data throughput rates of 6.45M bit/sec.

Up to Four Units

Standard features include a belt-driven disk which gives identical performance at 50 or 60 Hz, and a capability of expansion by daisy-chaining up to four units, the firm said.

Several sources at the show indicated there could be a large market for these high-capacity, relatively high-speed disk units, particularly among mini makers and in special-purpose systems.

But most of the enthusiasm was reserved for applications in the areas of terminals and data entry, where the higher capacity and speed were seen as real advantages for the 3330-like technology.

Court Ruling Said to Favor Patents

NEW YORK — In the recent Supreme Court Benson-Tabbot patent decision, there is no broad ruling implicit that will prevent the future grant of software patents by the Patent Office, according to Morton Jacobs, patent counsel for the Association of Data Processing Service Organizations.

"To the contrary, the Supreme Court decision actually draws a line between what is patentable and what is unpatentable in connection with computer software inventions," Jacobs said.

The Patent Office originally refused to grant a patent to Benson and Tabbot on the grounds that the patent would not be limited to a machine process, but would cover a mental process as well.

The Supreme Court upheld the previous Patent Office refusal because the patent claims would cover the performance of the mathematical process "without any apparatus," which would not be patentable subject matter, he said.

The Supreme Court ruling should actually make it easier to obtain process patents, Jacobs said, since the court denied the Patent Office position "that a process patent must be either tied to a particular machine or apparatus or must operate to change articles or materials to a different state or thing."

The court indicated its support for process patents for "the new, onrushing technology," by stating that it was not going to "freeze process patents to old technologies."

"Thus, the machine processes performed by computer systems, be they implemented in software programs or hardware programs, would, in appropriate circumstances, be patentable," Jacobs observed.

The court's decision that formulae and abstract ideas are not patentable should not discourage software companies from filing for inventive machine and machine

processes implemented in software, he said.

"Software is a machine process implemented in computer programs, while hardware is a machine process implemented in computer circuitry."

Jacobs believes that "apparatus claims" directed to a particular machine and to a particular end use actually survived the Supreme Court ruling, as evidenced by Justice William Douglas' statement, "It is said that the decision precludes a patent for any program servicing a computer. We do not so hold."

Apparatus claims are based on directing a machine in a unique way. Such claims, therefore, qualify as inventions which "control a process or algorithm" for a particular end use, he said. Apparatus patent claims are actually for the control mechanism, rather than for the process or algorithm itself, Jacobs added.

More Competition

Cassette Tape Drive Vendors Leery of Floppy Disk

By E. Drake Lundell Jr.
Of the CW Staff

ANAHEIM - OEM cassette tape drive manufacturers showed up in quantity at the Fall Joint Computer Conference, boasting of good sales, but with one eye on the rapidly expanding floppy disk manufacturers who are beginning to



Computer Access Systems

concentrate on some of the same markets.

Almost 10 firms serving the cassette market attended, mainly concentrated in one section of the hall that became known as "cassette row," and while the floppy disk makers were not as well represented, they became a major topic of conversation in the area.

Among the firms displaying cassette devices were Computer Access Systems, International Computer Products, Raymond Engineering, Redaetron Corp., Remex, Kybe Corp., Sykes Datatronics, Techtran Industries and Sycor, which operates an OEM cassette unit in addition to its intelligent terminal line.

"We're seeing good prospects here," a

marketing man at International Computer Products said, but admitted, "The floppy disk prices are coming down to a point now where we are running into them more and more in the marketplace."

"I think that there is a market for both the cassette drives and the disk units," another marketing man said, "but I will have to admit that in the past six months they have been giving us a lot more competition in areas we used to have for ourselves, especially in the terminal business."

"The floppy disk prices are now getting down to our range and are starting to give us some competition," Jerry Short of Redaetron admitted, but emphasized his firm had also seen "several" good prospects during the show.

The problem, one marketing man said, is that "we are now getting squeezed from both the cartridge manufacturers which have made some inroads into what we thought would be our market, and now from the floppy disk side of the business."

"There are some companies that want to go with the latest and therefore they are looking at the floppy disk before we have really been able to penetrate any of the markets thoroughly," he added.



International Computer Products, Inc.



Raymond Engineering

"We are still being hurt by the standardization battle," another admitted. "Potential customers aren't sure which way they want to jump and they don't want to get stuck with a system that might be declared non-standard at some later date."

"What worries me," one of the marketing men said, "would be customer reaction to the IBM floppy disk system in Europe. We have talked to several customers already who have said they might want to go with a floppy disk system in

case IBM introduces that unit or a similar one to the U.S.

"It is clear," he added, "that they could easily make the floppy disk unit the standard and users always want to stick with a product that has the 'IBM seal of approval.'"

Another agreed by noting there had been a slowdown in the cassette order rate in Europe since the IBM announcement.

"I wouldn't say there has been any real market churning, but the rate definitely slowed down and is behind our projections," he admitted, adding, "It seems to be coming back now somewhat to the old rates."

Mini Systems Age Due for a Change

ANAHEIM - General Automation, Inc. foresees a change in the emphasis accorded the minicomputer. Calling the 1960s the "Iron Age" of the minicomputer industry which "was characterized by a scramble among manufacturers to see who could produce the most hardware," GA said the 1970s will be known as the "Systems Age."

"The emphasis will be on systems, rather than on minicomputers, as new technologies give rise to new applications in emerging vertical industries."

In the second stage of development which will open up new applications, new OEM and standard systems will be developed.

"The minicomputer's role will be reduced to that of a component and the industry as it is known today will belong to those companies who have the systems expertise and can add the most contributed value to the minicomputer," according to the firm.



Remex Booth

Have we got Exhibitors for You!

A computer show is known by the companies it keeps. And we've got some of the best. These organizations - and others like them - will be appearing in the Exhibition portion of The Computer Caravan/73.

And they'll be bringing you the latest information on a wide variety of EDP products and services. So when you see the Caravan in a city near you, you'll see what you need to know to keep ahead of this fast-changing industry.

If you're a Computerworld subscriber, you'll be getting the details on the Computer Caravan/73 in plenty of time to sign up for our Forums and Exhibition when they come to a city near you. (By the way, the Caravan Forums are a unique way to discuss your problems in a completely user-oriented atmosphere. And they're well worth your time). If you're a computer marketer, there still may be time to make sure your company is there when the Computer Caravan/73 starts its second big tour. Call Neal Wilder or Dotie Travis right now for all the details - 617-332-5606.



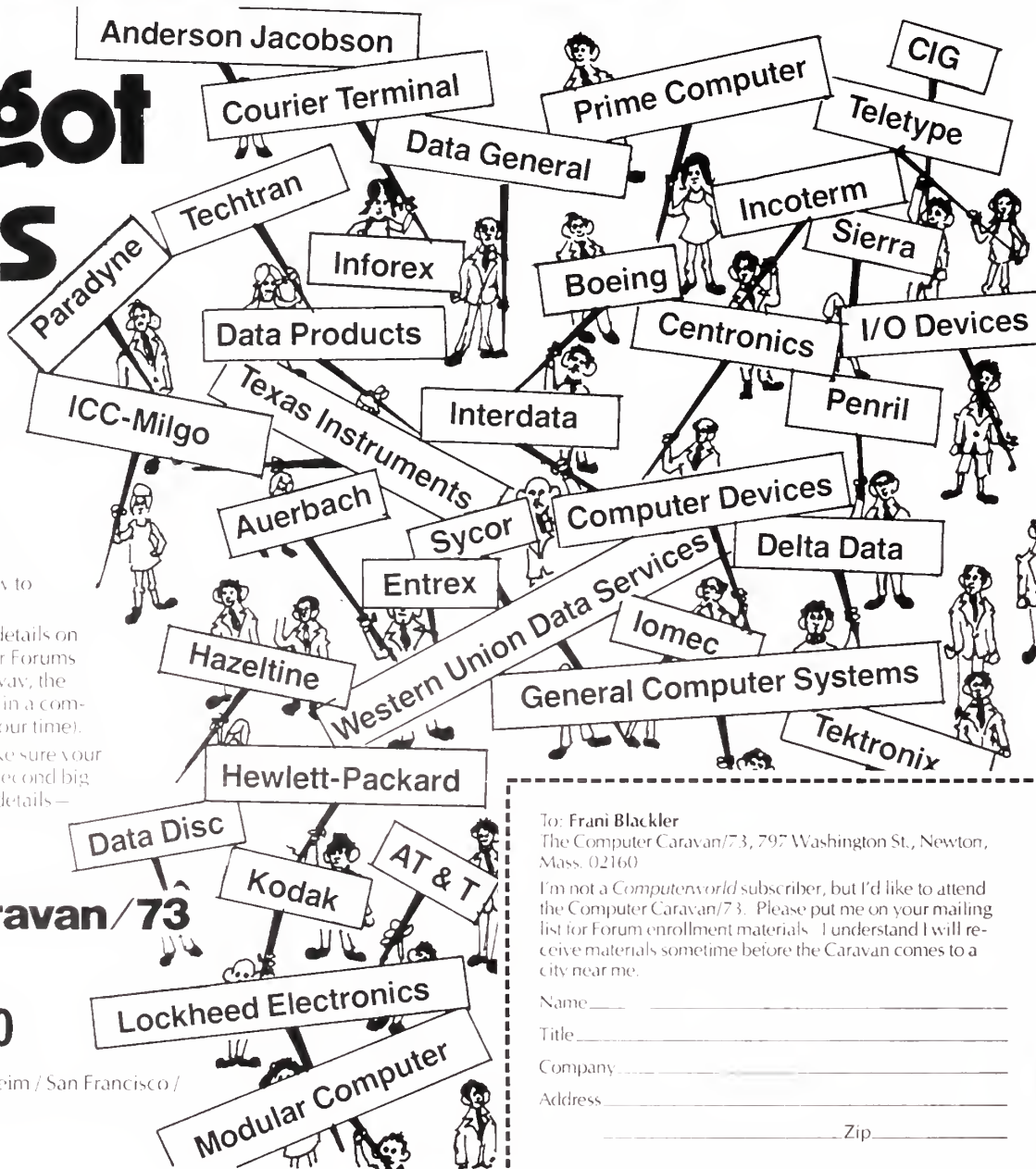
The Computer Caravan/73

sponsored by



COMPUTERWORLD

Boston / Washington / New York / Atlanta / Houston / Anaheim / San Francisco / Kansas City / Chicago / Cleveland



To: Frani Blackler
The Computer Caravan/73, 797 Washington St., Newton,
Mass. 02160

I'm not a Computerworld subscriber, but I'd like to attend the Computer Caravan/73. Please put me on your mailing list for Forum enrollment materials. I understand I will receive materials sometime before the Caravan comes to a city near me.

Name _____
Title _____
Company _____
Address _____
Zip _____

Minis, Memories, Modems

Some New Faces Introduced to OEM Marketplace

By E. Drake Lundell Jr.
Of the CW Staff

ANAHEIM — Several firms used the FJCC as a platform to launch new products ranging from minicomputers to tape and disk peripherals to output devices.

Computer Automation took the wraps off a new version of the Naked Mini with an 8-bit system that will sell for as low as \$1,450 in quantities of 200.

The "Byte Cruncher" uses 115 basic instructions and comes with 4K of memory in the basic unit expandable to 32K. The direct memory channels (2 standard, up to 64 optional) operate at up to 90K byte/sec, the firm said.

The memory speed is 1,600 nsec, with add/subtract time of 3.2 μ sec and multiply time of .18 msec. The unit also features three standard vectored priority interrupts with up to 256 optional, the firm said.

Data Products unveiled two new systems at the show, one in the medium speed printer area and the other an expansion of its core memory line.

The new 2230 impact printer operates at speeds up to 300 line/min in a 132 column format and can produce up to six carbon copies.

The unit, which is said to be the first in a planned new series of medium speed printers, is expected to be useful in the small computer systems and terminal area, Data Products said.

The character drum features 64 characters standard with options for 86 and 96 characters and has a modified Ascii font.

In the area of core storage the firm announced three new products: the Mini-Store; the Store/2000 which is compatible with the Electronics Memories Micro-memory-2000; and the Store/1885, compatible with the Ampex 1885 memory.

The Mini-Store has a 650 nsec cycle time and 270 nsec access time. The basic module is 8K by 18 bits expandable to 65K by 18.

The cycle time on the Store/1885 is 850 nsec or 750 nsec and access time is 340 nsec or 300 nsec. The basic configuration is 8K by 18 expandable to 65K by 18.

The Store/2000 has a cycle time of 1,000 nsec and access time of 400 nsec and comes in a 4K by 12 bit or 16 bit configuration, expandable to 32K by 18.

Ampex announced a new tape drive and core memory for OEMs in addition to a special 3330-type disk drive for the OEM marketplace (see story on page 37).

The TM-100 tape drive has speeds ranging from 10 to 50 in./sec and carries a purchase price of \$4,000 in OEM quantities. The unit has packing densities offered in pairs: 200 and 556 bit/in., 200 and 800 bit/in., and 556 and 800 bit/in. Phase encoded capability for 1,600 bit/in. is also offered, the firm said.

The model 9100 memory, Ampex said is the first core memory unit to offer a better cost/performance combination

than semiconductor storage in capacities of less than 4K words of 9 bits.

Using the Ampex Temperature Independent cores, the unit has an access time of about 400 nsec and is priced at less than 5.015/bit. The unit is offered with 1K, 2K and 4K 9-bit words and 1K and 2K 18-bit words.

Caelus Memories introduced three new tape drives: the Model 700 with a 7 in. reel, the Model 800 with an 8-1/2 in. reel, and the Model 1000 with a 10-1/2 in. reel.

Error rate for the units is said to be less than 1 bit in 10^8 . The drives feature triple density (200/556/800 bit/in.) and electronically selectable dual density of 800 bit/in. and 1,600 bit/in.

All three of the units are available in 7 or 9 track models. The model 700 operates at 12.5 in./sec, the Model 800 from 12.5 to 25 in./sec and the model 1000 from 12.5 to 50 in./sec, the firm said.

The Litton OEM Products Division pre-

sented its OEM Model 30 asynchronous serial printer which features 192 print positions, front form assembly, 30 char./sec operation and 47 print characters (26 alpha, 10 numeric and 11 special).

American Data Systems introduced a 4,800 bit/sec MOS modem priced at under \$3,000 or as low as \$1450 in quantities. The ADS-440/48 is a full duplex modem designed to operate over both conditioned or unconditioned voice grade telephone lines, the firm said.

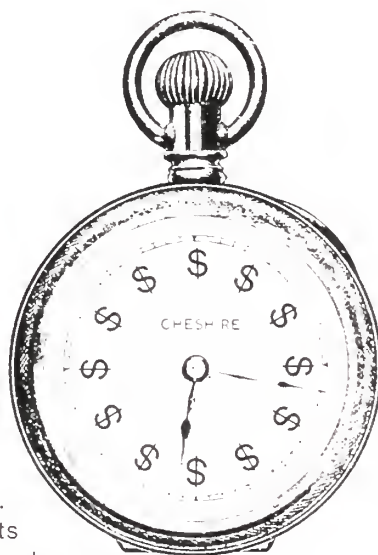
A switching option provides operation at 2,400 bit/sec and may be used to multiplex two independent 2,400 bit/sec data channels, ADS added.

CPS Inc. announced a high resolution 4-color CRT monitor at the show, the first move by this high power specialist into the display arena.

The unit, which offers red, orange, yellow and green colors, is priced at \$11,800 in quantities up to 25, the firm said.

Infonational "Money" Systems are solving problems for 65 companies. Today.

What we did for them, we can do for you. Tomorrow.



Infonational "Money" Systems will take your raw, unorganized financial data and translate them into valuable information for your management. Information that will increase efficiency, profitability, manpower and hardware utilization—even sales.

We have General Ledger, Accounts Payable, Accounts Receivable, Sales Analysis, Fixed Asset and Report Writer systems. According to your needs you may install one of them, all of them, or any combination.

We install these systems in a fraction of the time at a fraction of the expense of doing it "in-house." We've done just that for more than 65 major corporations who have more than 100 of our systems working for them in locations from Hawaii to England. And we had those systems in and working flawlessly in a matter of days, not months.

If your company's money needs a proven, accounting and financial reporting system devised by business professionals, call us! We are ready to start Infonational working for you tomorrow.

INFONATIONAL

620 "C" Street • San Diego, California 92101

INFONATIONAL		620 "C" Street, San Diego, California 92101 Phone 714/238-1242	
Gentlemen: Please send complete data on the financial systems checked.			
NAME _____			
FIRM _____			
TITLE _____			
ADDRESS _____			
CITY _____			
STATE _____ ZIP _____			
☐ General Ledger		☐ Accounts Payable	
☐ Fixed Asset		☐ Accounts Receivable	
		☐ Financial Report Writer	

Services Industry May Grow Rapidly Over Next 7 Years

ANAHEIM — The computer service industry will grow at a rate of 18% a year for the seven-year period starting in 1971, outpacing the computer industry in general, which will enjoy a 15% rate, according to an industry research executive.

David C. Jung, vice-president of Quantum Science Corp., told an FJCC audience that the facilities management (FM) sector would be the most dramatic, with sales leaping from \$645 million last year to \$2.9 billion in 1977.

Currently, 26% of all EDP expenditures is for some type of service, and this proportion will increase to 31% in 1977, Jung predicted.

He also foresaw the emergence and increasing popularity of multiservice vendors because users want to deal with fewer vendors, he claimed.

Network information services (time-sharing) will enjoy a growth similar to facilities management, Jung indicated, with that sector quadrupling sales from \$430 million last year to \$1.8 billion in 1977.

Software, Jung predicted, will grow from \$467 million to \$891 million in the period, while batch services will grow at a much slower rate, from \$650 million last year to \$750 million in 1977.

In support of the prediction that multiservice vendors would grow in number, he said these suppliers can enjoy economies in marketing and operation.

"Facilities management," he commented, "is a catalyst for multiservice vendors," since FM firms take over a complete operation, including ownership of products of many vendors.

Any media storage cabinet you buy now may be obsolete before it is delivered...

before you buy, find out about the improved storage efficiency and cost advantages of new optimedia™ cabinets

Two years ago we decided that it didn't make much sense to keep designing cabinets that were locked-in to the storage of cards only or tape only or one type of disk pack. So we studied the total media storage problem from all angles and came up with what we believe is the ideal solution, optimedia™ coordinated cabinets can store all types and sizes



of data processing media. They can store them in virtually any combination you desire, and — when your storage requirements change, optimedia cabinets can adapt to the changes. They're sort of a "living" storage system that won't become obsolete or leave you with excess capacity for one medium and not enough for another.

optimedia™ coordinated cabinets have other benefits such as "Action Level" storage that lets you place all media at the most convenient retrieval height, smooth operating roll up doors that open all the way leaving the entire inside fully accessible, and up to 20% extra storage capacity when compared to other cabinets with the same outside dimensions.

So . . . hold up that purchase requisition until you can hear the full story on optimedia™ coordinated cabinets. That way you may avoid buying something that's obsolete before it's delivered.

For the complete story on optimedia™ coordinated cabinets, call your local Wright Line office. You'll find it listed in the yellow pages in all major cities or contact us by writing direct or circling the readers' service number. Wright Line, a Division of Barry Wright Corporation, 160 Gold Star Boulevard, Worcester, Massachusetts 01606.

Wright
LINE

MEDIA MANAGEMENT SYSTEMS



Series 50, 6000 Systems Main Growth Contributors

BOSTON — Honeywell's growth in the past year has been largely in the area of the very small and large computer segments of the market, "while in the small and medium we are down slightly," Stephen F. Keating, Honeywell president, said recently.

Speaking before the Boston Security Analysts, Keating noted that "we think our experience corresponds to the industry booking-growth pattern."

In the large-scale class, Keating stated that "Series 6000 systems shipped and on order total 238 central processors at a value approaching \$500 million."

"Since we have no 600s in inventory and those being returned are scheduled for customers well into 1973, the net yield from this product is very high," he added.

In the middle of the line, Keating noted the Series 2000 was introduced 11 months ago and "to date the value of the 265 Series 2000 computers shipped or on order exceeds \$160 million."

New Models Due

In addition, Keating hinted the firm plans to add several new models to the

Series 2000 line during the coming years. "It is important to note," he said, "that although Series 2000 was intended primarily to give our customer base a means to upgrade, nearly 30% of the orders

Honeywell Speaks Out

received represents systems to supplement existing 200 systems or for new-name accounts.

"In other words," he said, "they do not involve the return of systems in place."

"Of those sites returning their 200s," he said, "the average value of the upgrade to the 2000 has run approximately 30%. We estimate the net yield on 2000s to be running at about 50%. That is not as high as the 6000 yield," he admitted, "but it is quite healthy."

At the low end of the line, Keating noted "the French-built Series 50 and particularly the Model 58 have been very successful. More than 3,000 Series 50

systems are installed or on order worldwide."

The major reason for the success of Honeywell in the past few years, Keating said, has been the successful integration of the GE computer business into that of Honeywell after the merger two years ago.

"The product fit we foresaw came to pass: Honeywell products in the broad medium range; GE products bracketing with small and large computers.

"The geographic fit also worked, combining Honeywell's strength in the U.S., the UK and Canada with GE's strengths in Continental Europe and other international markets."

The combination has also permitted economies of scale, Keating claimed.

"We are able to spend over \$100 million a year on research and development — substantially more than anyone else except IBM," he claimed, while noting "this is some \$30 million less than GE and Honeywell were spending separately."

But, he said, "we feel it is better spent

because it now has the broader input of the best of both company's approaches to computer technology."

DP Accounts for 50%

Keating indicated computers now account for roughly 50% of the firm's business with control systems accounting for the rest and "our computer business has increased its contribution to corporate profits since the merger."

Net shipments this year, he added, would run about 15% ahead of last year. "We believe this growth is in line with the industry on a worldwide basis, and therefore we are maintaining or possibly slightly gaining market share."

Keating noted "rental and service revenues have lagged somewhat behind our expectations during the first nine months of this year."

But, he said, "this trend is reversing now as we make shipments out of our backlog of Series 2000 and Series 6000 orders. We believe our rental and service revenue will increase in the fourth quarter."

Foreign Orders & Installations

The State Bank of Czechoslovakia has ordered multiple 620/L-100 minicomputers, multiplexers, controllers and other devices valued at over \$810,000 from Varian Data Machines.

The equipment will primarily act as concentrators and preprocessors in a network linking branch office banks to DP centers in Prague and Bratislava.

Computer Communications, Inc. has sold a CC-70 front-end processor to The Canada Systems Group Ltd. The system will be used with an IBM 370/168 and 158.

The Banco de Valencia, Spain, has ordered two NCR Century 300s for delivery early in 1974. The systems will be connected with terminals in 36 branches.

The Commercial Banking Company of Sydney Ltd. has ordered a Honeywell Model 6040 as the first phase of an on-line system valued at \$2 million. The 6040 will be linked to three Model 316s that will handle communications to terminals in 104 branches.

Pitney Bowes has installed a full-store Spice electronic register system with Pepper price-gag readers at a department store opened by Kaufhof Aktiengesellschaft in Leverkusen, Germany.

The Carron Co., Falkirk, Scotland, has ordered an NCR 100 for use in customer order processing, management inquiry and general accounting.

A Univac 1106 is being installed in the computer center at Sisak Steelworks, near Zagreb, Yugoslavia. Primary applications will include order entry, inventory control and product quality control, as well as cost accounting.

The Spanish Air Ministry has installed two Burroughs Air Traffic Control Systems in Barcelona and Madrid.

The cooperative data center for Dutch savings banks, the Cooperatieve Administratiecentrale voor Spaarbanken, G.A., has placed a \$4.5 million order with NCR for 440 NCR 270 electronic financial terminals as part of its program to link 300 savings bank branches.

British Overseas Airways Corp. has installed three Datatype Corp. Dataflow Optical Page Readers, minicomputers and tape punchers to complete the initial phase of the development of the Boadicea computer system.

Recognition Equipment has received orders for its OCR/S 2000 bank document processing systems totaling \$6.9 million from the Danish Postgiro, the Norwegian Postgiro and the Swedish Postal Bank.



The most wasteful equipment you own.

Pencil, paper and clipboard. Useful once upon a time. But today, too slow, too costly, too downright clumsy to use in modern business.

Of course inventory records, production schedules and other data still have to be collected and recorded. But how?

Consider an MSI Source Data Entry System. It eliminates clipboards, keypunching and the handling of punched cards. The delays of mailing or phoning information from one location to another are gone.

Since each unit weighs less than 4 pounds in total, and works on batteries, it

goes anywhere and gives hours of continuous operation. Each portable terminal can store up to 250,000 characters of information.

Data can be sent direct from the terminal over standard telephone lines to your data center for processing. No expensive telephone equipment required. No manual transcribing. No keypunching.

A variety of options are available for display, data verification and recording. You can use them wherever data originates. In the

plant. Across town. Across borders.

MSI will implement a total system that's tailor-made to your operation. We plan and coordinate all installation and see that your staff gets complete on-the-job training.

Our system can put you on more efficient and profitable schedules immediately. We can show you how in 20 minutes right in your office. We invite you now to send for our literature so you can learn more about MSI. You won't be wasting your time. Write to 340 Fischer Ave., Costa Mesa, CA 92627 (714) 540-6600

MSI
DATA CORPORATION





CPU Power

Technician at GTE Sylvania Inc. installs power supply in a CPU — for general-purpose computing — that can retrieve 24-bit words in less than 1 μsec.

Vendors, Take Note of This Discount!

By Lynn Bateman

Special to Computerworld

WASHINGTON, D.C. — When the Federal Government conducts a procurement, a vendor is allowed to stipulate a prompt payment discount on the standard form, but very few computer industry vendors use this option to their advantage.

What most vendors don't know is that the government is obligated to subtract prompt payment discount (ppd) from the evaluated price in determining a winner of the procurement. It is estimated that over 80% of vendors does not understand ppd sufficiently to take advantage of it.

Superficially, this may seem unimportant — not so!

Assume, for example, that a vendor wants to set a selling price of \$20,000 for a particular device. When he bids the device in a government procurement, he should price the item at \$20,105 and allow a 5% ppd if paid in 20 days or less. Generally the government will not accept a ppd of more than 5% on the reasonable ground that a larger discount should con-

stitute a general price reduction.

On the other hand, you can price your device at \$20,000 and offer a 1% 20-day discount on the assumption that the government will seldom qualify, so you will be paid the full amount but be evaluated at \$19,800. Even if the government does pay within 20 days, little is lost.

Generally, any time period of less than 20 days is not evaluated because the government cannot anticipate that the disbursing section can meet such a short time frame. The time period is governed by Title 41, Public Contracts, Chapter 1 — Federal Procurement Regulations Subpart 1-2.407-3.

In actual practice, the government will take this discount if the bill is paid on time. If the discount is taken after the stipulated time period has elapsed, the contracting officer, when contacted by the vendor, will authorize additional payment by the government to cover this improper action.

In addition to the evaluation advantage provided by a ppd, other advantages accrue.

For example, any disbursing officer will pay those bills offering a ppd first. Hence, one improves his cash flow position. Another advantage lies in the fact that the device is evaluated at \$20,000, but you collect \$20,105 if the government is late in paying.

So, you can't lose with a ppd.

Another item to consider is rental credit.

Suppose a particular procurement has as part of the evaluation criteria some form of rental credit. You can offer the rental and suggest that it applies before the ppd is taken. In this manner your proposal earns a percentage of the 5% ppd in evaluation credit.

One final note on the human interest side of the ppd — any government contracting officer will have the cockles of his heart warmed to see a ppd. When it appears in a proposal, it is like cookies from home. He feels he is getting something free. Give it to him. You can't lose.

The only way a vendor loses is when he ignores this regulation.

Lynn Bateman is with Federal Marketing Counsellors, Inc., Arlington, Va., a firm which assists DP companies with their federal marketing efforts.

Some IBM 360 users have chosen to upgrade their existing systems rather than jump into a 370. Many others still face this important decision. And if you're in that position, our January 31st Supplement will be a big help.

Supplement Editor Ron Frank has talked to users who have upgraded, and he'll report on their experiences and problems. Cost factors will be analyzed, and there will be a survey of the various tools now available for upgrading a 360, including:

- Independent main memories
- Faster peripherals
- DAT Boxes
- Independent software

If you're a 360-user, you'll find a lot to think about in this supplement. And if you have a product or service which can upgrade a 360, you should be advertising in this special supplement. Your Computerworld representative can give you all the details. Or call Judy Milford at (617) 332-5606.

**On January 31st,
Computerworld shows
"How to upgrade
your 360."**



Orders & Installations

The National Aeronautics and Space Administration has ordered a Univac 1110 system to replace two 1106s and two 1107s. The 1110 will serve as front end and job scheduler for four 1108s. During Skylab missions, the system will handle data acquisition and reduction via a wideband communications link between the 1110 and Nasa computers in other locations.

Itel Corp. has installed 1 Mbyte of main memory on a 370/155 at Scott Paper Co., Philadelphia.

Ocean Products, Inc., Dover, Fla., has ordered an NCR 101 to monitor sales, inventory and accounting of its breaded and frozen shrimp.

Rensselaer Polytechnic Institute has installed an Information Displays, Inc. Idiom computer-driven display system in its School of Engineering. The unit will be used to investigate the use of interactive graphics in a variety of process control applications.

The Rochester Institute of Technology has installed Datatype Corp.'s Setype (OCR) system at its school of printing for use in vocational instruction classwork.

The Associated Press has ordered 300 data TE-1200 modems from Collins Radio Co. for installation in AP offices around the nation.

Mead Data Corp. has installed 20 Edterm 100 intelligent display stand-alone units and ordered 80 additional units from SYS Computer Corp. The units will be installed in accounting firms and the Securities & Exchange Commission.

The Cabell Huntington Hospital, Huntington, W. Va., has installed an NCR 50 to handle business applications.

The Grand Union Co., a supermarket chain, has licensed the Acres telecommunications package from Trilog Associates, Inc.

Galaxy Foods, Inc. is installing a computerized order entry and delivery system developed by Incotel, Ltd. The system uses a Varian 620/L-1000 mini and modular software.

Northeast Medical Suppliers has ordered CI-2 minicomputers from Computer Interactions, Inc. for installation at all the firm's locations, where the units will keep patient prescription activity and history records. The systems will also be used to alert personnel to possible harmful reactions caused by mixing different prescription drugs.



Minicomputers, we've got you surrounded.

So take a closer look. The MDS family of OEM peripherals is growing.

Newest is the 2021 cartridge tape drive, first in the industry to use 3M's versatile data cartridge.

Almost as new is the 100 cps impact matrix printer, and the 2 to 8 million bit head-per-track disk drive, and our auto-loading, 125 ips vacuum-buffered tape drives; plus a 400 cpm mark sense card reader.

They add even greater muscle to Mohawk's existing line-up of equipment that helped make us the Peripheral Power.

Products such as a 300 or 600 lpm chain printer. A clean-picking 225 to 600 cpm card reader. A multitude of proven digital lister printers, and slow speed, low-cost paper tape readers and punches.

Doesn't that sound like plenty of reason to start a conversation? Good.

You call. We'll come. Phone us at (215) 337-1910.

Or write OEM Marketing, Mohawk Data Sciences Corp., 781 Third Ave., King of Prussia, Pa. 19406.

MDS

The Peripheral Power

DFI
LEASES *

"CREAMPUFFS"

1316's 3336's
2316's 5440's

2315DD's
2315's

et al, etcetera, others and so forth

***We sell'em, too!**

.... Call
Martha Washington
Data Funding, Inc.
#2 Industrial Boulevard
Paoli, PA 19301
(215) 647-5040

'Used' Market Gets Group Voice

KANSAS CITY — A trade association formed to give voice to the used computer dealers was formed by 34 firms meeting here recently.

The Computer Dealers Association "will be the industry voice to mainframe manufacturers, leasing companies, independent peripherals manufacturers, the U.S. Government (to help the government expand its understanding and acquisition of used computers and peripherals), freight forwarders, insurance companies and third-party maintenance companies," the organizers said.

Broaden Market Awareness

The group "will also strive to broaden the computer users' awareness of the billion dollar used computer market," the founders added, noting that of the approximately \$30 billion in computer-related installed equipment, \$10 billion is owned by non-manufacturers.

President of the new organization is A.F. Monosson, president of American Used Computer Corp., and the vice-presidents include Edward Cherney, president of CMI Corp., and Norman Burger, president of Corporate Computers Inc.

Founding membership includes, in addition to the above, Associated Computer Services Equipment Corp., Comdisco Inc., Computer Resale Exchange, Computer Resale Corp. Ltd., Computer Systems/Graphics Inc., Computer Trade Corp., Computer Wholesale Corp., Continental Information Systems and Data Automation Services.

Others are: DP Equipment Marketing Corp., Dataserv Equipment, Inc., Econocom, Evergreen Computer & Financial, Inc., Forsythe/McArthur Associates, Inc., The Halsey Corp., HNB Marketing Co., ICC Computer Corp., I.O.A. Data Corp., IPS Computer Marketing Corp., M.L. Johnston & Associates, Inc., Lunceford & Associates, Inc., LXX Computers & Peri-

pherals, Inc., George S. McLaughlin Assoc., Inc., William Marion Co., Nationwide Computers, NVC Computer Sales, Inc., Oliver & Associates, Professional Re-marketing Organization, Thomas Computers, Time Brokers, Inc. and Trada-comp, Inc.

Information Systems Expected to Fill Needs of Utilities

LAKE BUENA VISTA, Fla. — Computerized information systems are needed in the nation's electric and gas companies as their business environment becomes more political and complex, according to Leonard A. Muller, president of GTE Information Systems.

Speaking at the 20th annual Public Utility Information Systems Conference here recently, Muller said "management decisions can no longer be made unilaterally, but are increasingly subject to public scrutiny and review."

"Customers are becoming more systems-oriented, using computers to study problems that were formerly considered solely in the utility's domain."

At the same time, Muller noted the computer industry was also changing with more and more of the DP dollar being spent outside the computer room.

"While technology has given us the capacity to centralize with huge data bases," he said, "it has also provided us with the power to decentralize with intelligent terminals and distributed networks that are more responsive to the end user."

"The most important long-term effect of our data communications systems will be decentralized systems, with more computer power in the hands of the end users, the people who need it," he added.

Next May, we're opening the world's second largest computer market.

Our new European Computer Caravans will bring your products or services within a hundred miles of 85% of European Computer users.

The U.S. Computer Caravan is a proven success. And now we're taking the concept to Europe — with three European Computer Caravans. If you now market in Europe, you'll find your present and future customers attending the Caravan. And you'll be able to deal with them in an effective selling atmosphere.

If you aren't currently marketing in Europe, you're missing a \$4 Billion market. And we can help you break into it. With our new Computer Caravans — and with a variety of optional services, including:

- overall market data
- customized marketing research through IDC, the world's largest EDP research organization
- advice on how to get government help
- expert booth staffing to identify prospects and screen potential representatives

That's just the overview. Why don't you get the whole story by writing or calling Neal Wilder or Dottie Travis (617) 332-5606. They'll be glad to send you a copy of our free brochure.

French Market Caravan
May 1 - June 7, 1973

Paris
Bordeaux
Marseilles
Lyon
Strasbourg
Brussels

English Market Caravan
Sept. 4 - Oct. 18, 1973

Stockholm
Oslo
Copenhagen
Amsterdam
Glasgow
Manchester
London

German Market Caravan
Oct. 23 - Dec. 6, 1973

Hamburg
Dusseldorf
Frankfurt
Stuttgart
Munich
Berlin

The European Computer Caravans
sponsored by



COMPUTERWORLD

797 Washington St., Newton, Mass. 02160

E LEARNING OBJECTIVES

**Dorothy Tucker
wouldn't be
where she is today
without ACM.**



**Or moving ahead
as fast.**

Dorothy Tucker is Chairman of the New York City Chapter of ACM. She's also Internal Training Consultant for the Computer Systems Department at Bankers Trust, a position with considerable management responsibility. She's involved in a highly sophisticated in-house training function, keeping managers and systems analysts in one of the largest banks in the country up-to-date on the latest trends and techniques in data processing education.

"I wouldn't be in this job if it weren't for ACM" says Dorothy. "I had been involved in DP education and marketing for a number of years. My ACM Committee work and chapter meetings resulted in a lot of additional contacts. One of them led to this job.

"Since joining the bank, I've found my activity in ACM helps me do my job better. It's not just keeping up with the state-of-the-art. It's reinforcing the professionalism of our field. And using

my leadership experience in motivating volunteers at ACM to do a better job in DP training work at Banker's Trust. I really think ACM has helped me find—and grow in—a new, satisfying career.

Dorothy Tucker has more than enough ability to do her job well. Being active in ACM gives her something extra.

Look into joining ACM now. Send in the coupon today.

.....
Association for Computing Machinery
1133 Avenue of the Americas
New York, New York 10036

I would like to consider joining ACM.
Please send more information.

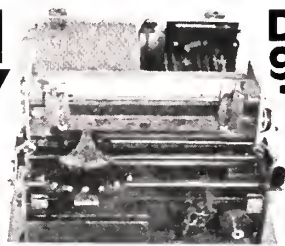
Name

Position

Address

City State Zip

acm
Association
for Computing
Machinery

TOUGH
TTYDI-AN'S NEW
9030
TELEPRINTER

Tough...inside where it counts. We've taken the cover off so you can see for yourself. Rugged, durable construction for heavy-duty use. Just three simple moving assemblies and advanced integrated circuitry. No cams, no complicated linkages, and no oscillating ratchets commonly hidden inside other asynchronous impact printers. You get improved reliability and lower maintenance costs. Our design also offers a unique extra...unlimited life. (Any assembly that fails can be replaced in a half hour or less using a screw driver and wrench.)

All this plus tough-to-beat features: operator selectable 110, 150 or 300 baud transmission; half and full duplex or local operation; upper and lower case printout; odd, even or no parity error detection; form-feed tractors that adjust from one to 16 inches and 132 columns; six-part copy; RO, KSR, and ASR versions.

Three years in-house testing and 18 months field testing preceded production. We *KNOW* it works.

Write for complete details.

DI-AN CONTROLS, INC.

944 Dorchester Avenue
Boston, Massachusetts 02125

frequency division multiplexer

FEATURES...

INDICATORS: Multi-colored display panel provides indication of four control and two data functions.

MULTI-DROP: Drop one or more channels at a number of locations.

MULTIPLE ACCESS: Multi-drop channels have equal opportunity contention for processor channels.

BUSY-OUT: Busy-Out control of remote modems.

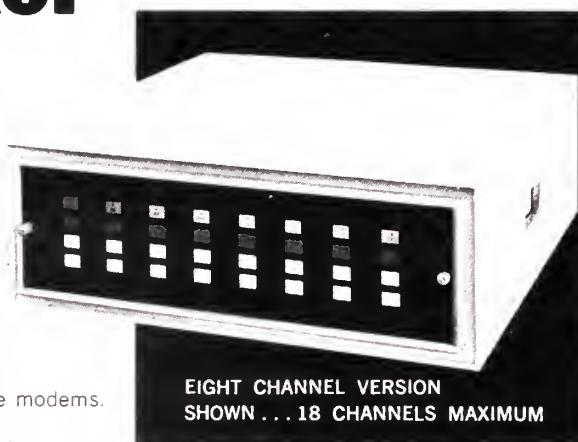
LOOP-BACK: Test features provide rapid system diagnostics.

DATA RATES: Mix 110, 150 and 300 baud channels.

CONTROLS: Processes all modem control functions.

VOICE-PLUS-DATA: Simultaneous voice channel with four data channels.

OPTIONS: Many other optional features.



EIGHT CHANNEL VERSION
SHOWN... 18 CHANNELS MAXIMUM

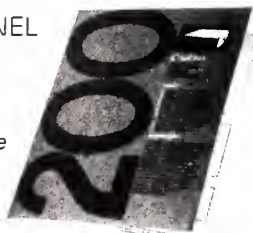
SAVE 4-WAYS

- 1 No high speed modems required.
- 2 No private line conditioning required.
- 3 Modular construction permits starting with one channel and adding others as needed.
- 4 Eliminate long distance phone calls with voice-plus-data.

\$465 BASIC UNIT **\$325** PER CHANNEL
\$15.80 PER MONTH* \$11.00 PER MONTH*

* 3 Year Lease with Purchase Option

Send for
FREE Brochure
today.



Data Channel Concentrators and Expanders, Modems,
Line Test Units and other Data Communication Equipment

COMDATA CORPORATION

7544 W. OAKTON ST. □ NILES, ILLINOIS 60648 □ 312/692-6107

Industrial Robot Uses TV Camera, Mini to Store Images for Selection

TOKYO — Hitachi has developed an industrial robot system that can recognize and select specific objects from a mixture passing by on a conveyor belt.

The Hitachi Visual Image Processing Robot uses a television camera attached to a mini capable of storing 32 images. In the selection process the camera scans the objects and feeds the data on the images to the computer. The systems can discern shape, size, position and posture

of the objects.

The pattern is compared by the computer with the patterns in memory and if action is needed, an order is given to the handling mechanism.

To store images in the system, the object is placed below the camera and a special function key is pressed causing the object to be stored. When the belt is moving, Hitachi said the system could recognize objects at the rate of around one a second.

Contracts

Advanced Memory Systems, Inc. has received a contract valued at over \$1 million from Memory Technology, Inc. for the AMS 6003, a 2K word by 1 bit, P-channel dynamic RAM.

Vogue Instrument Corp. has received a contract from Emerson Electric Co. for 65 Model 400C High-Speed Line Printers for use in a computerized label printing system.

General Electric Co. has received a contract from the federal Maritime Administration to develop a satellite-aided merchant-ship operations control system. The system will use a shipboard computer linked through orbiting satellites to a shore-based computer.

TRW Data Systems has agreed to purchase a minimum of 100 Computer Terminal Corp. Data-point 2200 systems over the next two years. The units will be used as part of an on-line credit verification system for the retail and banking industries.

Georgetown University Hospital, Washington, D.C., has selected Compucare, Inc. to provide facilities management services.

Computer Sciences Corp. has received a \$3.1 million Army contract for programming for the Safeguard System Command and the Army Ballistic Missile Defense Agency.

International Telephone & Telegraph Corp.'s Defense Communications Division has received a \$7 million Army contract for a prototype communications switching system. Burroughs Corp. is a subcontractor.

Datacraft Corp. will supply Boeing Co. with four DC 6024/5 computers for use in real-time simulators for the B-1 bomber program.

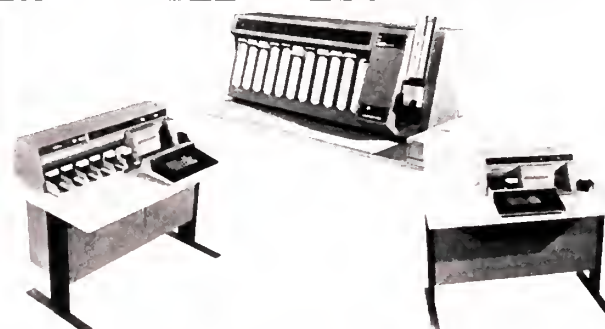
AAI Corp. was issued a \$5.3 million Air Force contract for computer test sets for F4 aircraft.

AMI Industries, Inc. has received a contract from the First National City Bank of New York for data processing of its direct marketing activities.

Bunker Ramo's Electronic Systems Division has received a contract from McDonnell Douglas Automation Co. for the development of a factory data entry system. The system will be installed initially at the Douglas Aircraft Co., where it will be used to enter production and tooling orders into the central DP system.

System Development Corp. has been awarded a \$10.3 million contract to continue as computer program integration contractor for the Air Force Satellite Control Facility (AFSCF).

IT'S ALL IN THE FAMILY



Throughput gains. Reliability. Dollar savings. Versatility. Cost effective solutions to 96 column data preparation problems. All in Decision Data's family -- 9601 Data Recorder, 9610 Interpreting Data Recorder, 9660 Sorting Data Recorder, and the 9620 Alphanumeric Sorter.

Select the units you need to match your requirements, just as you configured your system. And since family benefits last as long as you keep your computer, it's important to know that Decision Data gives you a choice. Between machines and suppliers.

THE FAMILY: 4 SuperMachines from Decision Data.

DECISION DATA
100 WITMER ROAD, HORSHAM, PENNA 19044
(215) 674-3300 □ TELEX 83-1471

We've drawn a blank, you can fill it in.

order your own subscription

Please send me COMPUTERWORLD for:

☐ 1 year — \$9*

*\$10 a year in Canada; all other
Foreign, \$25 a year.

☐ Charge My American Express Account:

--	--	--	--	--	--	--	--	--	--

If charge, we must have cardholder's signature:

First Initial	Middle Initial	Surname										
Your Title		December 13, 1972										
Company Name												
Send to: Address												
City								State	Zip Code			

Address shown is: Business Home

☐ Check here if you do not
wish to receive promotional
mail from *Computerworld*.

COMPUTERWORLD • Circulation Department • 797 Washington Street • Newton, Mass. 02160

PLEASE CIRCLE 1 NUMBER IN EACH
CATEGORY

YOUR INDUSTRY

- 01 Mining/Construction/ Oil & Refining
- 02 Manufacturing — Computer or data
system hardware/peripherals/other
associated mechanical devices
- 03 Manufacturing (other)
- 04 Utilities/Comm. Sys./Transportation
- 05 Wholesale/Retail
- 06 Finance/Insurance/Real Estate
- 07 DP Serv. Bureau/Software/Planning
- 08 Business Services (except DP)
- 09 Education/Medical/Legal
- 10 Federal, State and Local Govern-
ment
- 12 Communications/Printing/Publishing
- 13 Other: _____

YOUR FUNCTION

- 01 Corporate Officer
- 02 Data Processing & Operational Man-
agement
- 03 Data Processing Professional Staff
- 04 Consultant
- 05 Lawyer/Accountant
- 06 Engineering-Management/Scientific/
R&D
- 07 Sales/Marketing/Account Executive
- 08 Librarian/Educator/Student
- 09 Other: _____



COMPUTERWORLD
THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

DP Lagging in Bahamas

By Bohdan Szuprowicz
Special to Computerworld

NASSAU, Bahamas - Although there are 354 different banks registered in the Bahamas and several top U.S., Canadian and British banks operate branches in Nassau and Freeport, there are only a dozen small- to medium-sized computers in all of the 700 islands. Only one, a small IBM System 3, is reportedly installed in a local Nassau bank.

"What's incredible," said A. Ross, vice-president of Caribbean Computers Ltd., "is that the banks here are not even using magnetic code on checks and most operations are done manually."

Another computer firm, Data Management Ltd., proposed setting up a time-sharing system for groups of participating banks but became discouraged when little interest was shown.

Computerization of Bahamian banks is not the major objective of Caribbean Computers Ltd., which started operations only last March. It is a computer services firm and is the authorized distributor for Honeywell computer hardware in Bahamas, Jamaica and other Caribbean areas.

H-58 Bought

Three months ago the company sold a small Honeywell H-58 system to a hotel chain and included in the package specialized software for hotel reservations, billing and accounting functions. Ross sees considerable potential for this system, which he feels is price accessible for many smaller hotels throughout the Caribbean area.

Even in the industry there is little computerization so far, as many large hotels belong to international chains and use only a communications terminal.

Only Kings Inn in Freeport operated a local IBM 360/20 on its premises until a year ago when the hotel and its computer were destroyed in a fire. The hotel is opening up again this coming season with an IBM S/3 as a replacement.

The initial government installation quickly expanded to an IBM 360/20 system and is now being replaced by an IBM 360/30 with 96K of memory and five terminals. The new system will handle immigration, payroll and utilities billing as well as customs duty applications.

Aussies Use Mini In Stress Grading

Special to Computerworld

SYDNEY, Australia - A mini-computer, designed and built in Australia by Plessey Telecommunications Ltd. of Meadowbank, New South Wales, is bringing home the export dollars.

Part of a timber stress grading machine, the mini has been sent to New Zealand, Japan, South Africa, the Philippines, the U.S. and the UK, as well as Australia.

Although a simple machine programmed by insertion of one of a selection of circuit cards, its application has brought an optimism to Australia's growing DP industry.

The grading machine is one of the few to be approved in the UK and the U.S. by timber research and building code authorities.

Timber passing through the machine is subjected to a known load and deflection measured at six-inch intervals. The mini does the necessary calculations and allocates one of five grades to each section tested.

POSITION ANNOUNCEMENTS

DIRECTOR, College Computing Center

Director is responsible for expanding educational use of computer and for general administrative oversight of the facility (terminal linked to U. of Iowa IBM 360/65). College teaching experience and administrative experience desired. Position available Summer, 1973. For details write:

Associate Dean of Administration
Grinnell College
Grinnell, Iowa 50112

Programmer/ Analyst

male or female needed for B5500/student information system. Two years COBOL required. ALGOL helpful. Salary commensurate with experience. Send resume and salary requirements to:

Personnel Office
University of Detroit
Detroit, Michigan 48221
An Equal Opportunity
Affirmative Action Employer

FACULTY POSITIONS

Computer Science and Technology Department has several openings: (1) Business applications specialist with advanced degree; (2) Ph.D.'s in Computer Science (or similar field); (3) Experienced computing specialist (academic or industrial/commercial applications) for a 3 mo. to 1 yr. internship program - professionals on sabbatical welcome. One position available Jan. 1; others July 1, 1973. Equal Opportunity M/F Employer.

Apply to
Dr. John L. Gunter
Rochester Instit. of Tech.
One Lomb Memorial Drive
Rochester, N.Y. 14623
(716) 464-2811

Position Announcements

SALESMAN WANTED

Leading computer ribbon manufacturer seeks experienced Sales and Managerial personnel, representatives, etc.

Excellent opportunities for men now selling computer ribbons, typewriter ribbons and computer tapes.

CW Box 3733
60 Austin Street
Newton, Mass. 02160

SYSTEMS ANALYST

Applicant credentials are a B.A. degree (preferably business or math-science related) with 3-5 years experience Cobol OS-MFT and disk file processing.

Send complete resume including salary requirements in confidence to:

Mr. Al. Perly
Staff Personnel Office
University of N. Iowa 50613
Cedar Falls, Iowa 50613

An Equal Opportunity Employer

ENGINEERS and COMPUTER SCIENTISTS

Our developing programs have created these exceptional openings in California and in Buffalo, New York.

NAVAL COMPUTER SYSTEMS ENGINEERS RADAR SYSTEM ENGINEER SOFTWARE DEVELOPERS

(Test planning and direction of complex computer/electronic systems)

RADAR SYSTEMS ANALYSTS

(Radar target designation and discrimination; development of statistical estimation and decision techniques; parametric systems studies)

COMPUTER SOFTWARE ENGINEER

(Development and implementation of software for integrated avionics computer complexes)

DIGITAL SIGNAL PROCESSING ENGINEER

(Digital processing, real time simulation, digital logic machines and radar systems)

Positions Listed Require Security Clearance

We invite you to:

EXPLORE THESE OPPORTUNITIES

At The - FALL JOINT COMPUTER CONFERENCE

Phone: L.A. Answering Service
(213) 461-4646

(WE WILL ACCEPT COLLECT
CALLS FROM AREA CODES
714 and 805)

or

By Mail - Send complete resume to:
Mr. F.J. Severance, Employment Manager

Calspan CORPORATION

(Formerly CORNELL AERONAUTICAL LABORATORY, INC.)

P.O. Box 235, Buffalo, New York 14221

An Equal Opportunity Employer/Male and Female

POSITION ANNOUNCEMENTS

UNIVERSITY OF OTAGO DUNEDIN, NEW ZEALAND COMPUTING CENTRE SYSTEMS PROGRAMMER

Applications are invited for the position of Systems Programmer in the University Computing Centre. This is an academic position equivalent to that of Lecturer. A Burroughs B 6700 computer is to be installed early in 1973.

Duties will include assisting with the general teaching work of the Department, software development and advisory assistance to computer users. Active research will be encouraged.

Applicants should hold a second degree either in computer science or in a major applications discipline, and preference will be given to those with experience or research interests in data communications or virtual memory machines.

Salary will be on the scale for Lecturers - \$NZ 5,589-\$7,149 per annum. (Note \$NZ 100 equals approximately £48 sterling; \$US 119; \$A 100.) Salary scales are subject to both triennial review and cost-of-living adjustments.

Further particulars are available from the Secretary-General, Association of Commonwealth Universities, 36 Gordon Square, London WC1, or from the undersigned. Applications close in New Zealand and London on 15th December 1972. Late applications will be considered.

J.W. Hayward
Registrar

SYSTEMS ANALYST/ PROGRAMMERS

BAL COBOL CICS/DOS CIF

We are a progressive, growth oriented financial corporation offering an excellent opportunity for an individual with a proven record in communication and documentation skills, high abilities in BAL and COBOL and capable of handling applications in an on-line CICS environment. If you wish a challenging responsibility, send resume and salary requirement in confidence to:

VP/Per.
PO Box 2060
Waterbury, CT. 06720

SYSTEMS ANALYSTS PROGRAMMER/ANALYSTS PROGRAMMERS

Growth of Ft. Lauderdale-based national home furnishings chain has created several openings within the corporate systems development group.

If you have a record of accomplishments, regardless of the level you are at now, you are of interest to us. We want top programmers, top programmer/analysts, and top systems analysts to help develop the finest information system in retailing. Send resume including salary history to:

Mangurians, Inc.
Director of Personnel
P.O. Box 24090
Ft. Lauderdale, FL 33309
An Equal Opportunity Employer

PROGRAMMER/ ANALYSTS

SCT needs implementation oriented PROGRAMMERS and PROGRAMMER/ANALYSTS with a record of accomplishment on third-generation hardware utilizing COBOL.

We are a privately held, rapidly expanding firm specializing in administrative applications in the non-defense public systems areas. Initial assignments, leading to project responsibility, are based on experience. Advancement is based solely on performance.

For an outstanding career opportunity, as well as top salaries and stock options, contact:

John O'Brien
SYSTEMS & COMPUTER TECHNOLOGY
CORPORATION (SCT)
7 North Five Point Road
West Chester, Penna. 19380
(215) 692-7990

POSITION ANNOUNCEMENTS

MINI-COMPUTER SPECIALISTS

Our company represents several organizations in the Mini-Computer field. They are seeking people with backgrounds in any of the following areas: Design & Development, Applications, Marketing, Programming. Positions range from Sales Engineers to Chief Engineer. Experience in Software and Hardware. Salary range from 12k-25k.

Resumes are also invited from professionals in other disciplines.

U.S. Citizenship Required.

Send resume, including salary information, to Mr. Mel Pomerantz, Vice President Micro-electronic Engineering.

FRANK X. WALSH & CO., INC.

811 E Wisconsin Ave
Milwaukee, Wisc.
53202
(414) 272-8845

Customer Service Engineers

Positions are available in major cities throughout the U.S. for customer engineers with systems field service experience on large scale commercial computers and all related peripheral equipment.

Be a part of this vigorous growth and realize your maximum potential within your career field. You'll need a minimum of 2 years applicable experience.



AND ASSOCIATES

5518 W. DIVERSEY AVE.
CHICAGO, ILL. 60639
OFFICE (312) 736-6836

POSITION ANNOUNCEMENTS	POSITION ANNOUNCEMENTS	BUY SELL SWAP	BUY SELL SWAP	BUY SELL SWAP																						
FIELD SERVICE ENGINEERS Familiar With the 360 & 370 These are unique opportunities with a rapidly growing little giant of the computer peripheral industry. CMI has a fine reputation and has achieved excellent acceptance throughout the world for its product line. Our Technical Support Center has need for Field Service Engineers at all levels of experience at various locations throughout the U.S. and Europe. Responsibilities will involve performing installation, maintenance and related services on CMI products. You may also perform design engineering liaison and training. Please call (collect) 617-369-8850, or forward your resume to: D.C. Turner.  CAMBRIDGE MEMORIES, INC. 696 Virginia Road Concord, Mass. An Equal Opportunity Employer		FOR SALE CUMMINS CARDIONER \$2400.00 Call 503-232-7069		QUALITY IS WHAT WE'RE ALL ABOUT!!! The results? International leadership in the purchase and sale of IBM 360-370 computer systems. If you are considering the purchase or sale of used IBM equipment, find out why ICX is the international leader in this highly specialized business. Why are we so concerned with quality? Because we think that doing business with you should be a forever thing. • Lower Costs • Guaranteed IBM Maintenance Agreement • Fully Reconditioned • Timely Delivery • Site Engineering Write or phone for details: Pat Baker—Domestic Dale Lewis—International ICX Group Headquarters 1660 L Street, N.W., Suite 201 Washington, D.C. 20036 (202) 466-2244 ICX	FOR SALE OR LEASE 360-20-30 1401-2-3-6  CONTACT: T.M. Brookes BROOKS INTERNATIONAL, INC. 27-31 Ludlow Fort Worth, Texas 76105 (817) 531-2761																					
		FOR SALE 360/50 H (256K) OR LEASE with UPGRADE PRIVILEGE TO 360		WANTED IBM 360/20 D2 SYSTEM NCR 395, 400 BURROUGHS E4000, L2000 Call Stuart Rubenstein I.O.A. Data Corp. 383 Lafayette St., N.Y. 10003 (212) 673-9300																						
Buy Sell Swap UNIVAC 1108 SYSTEM Sale or Lease SUBSTANTIAL SAVINGS *65K or 131K Core Configuration *Multi-Processor Capability Contact CW Box 3754 60 Austin Street Newton, Mass. 02160		FOR SALE/LEASE UNIVAC 1004/1005 PROCESSOR AND 1004 CARD PUNCH. WIRE BOARDS AND 1005 MODULE INCLUDED. CONTACT J. SHIPP (301) 342-7800		SYSTEMS EQUIPMENT LESSORS INC. (203) 661-2700																						
FOR SALE 14 used 3021 Storage Cells for an IBM 2321 Contact: Office of the Comptroller Data Processing Operations Division Clark County Courthouse, 200 East Carson Street Las Vegas, Nev. 89101 Attn: G.A. Jaenicke, Mgr. (702) 386-4011 Ext. 294		EXCLUSIVELY OURS FOR SALE FOR LEASE <table border="0"> <tr> <td>2040-H (with I/O)</td> <td>April</td> </tr> <tr> <td>2520-B3</td> <td>Now</td> </tr> <tr> <td>2050-H</td> <td>Now</td> </tr> <tr> <td>2050-I</td> <td>Jan</td> </tr> <tr> <td>2040-G</td> <td>Now</td> </tr> <tr> <td>2030-F</td> <td>Now</td> </tr> </table> Dekade Data Company 253 Riverside Ave. Westport, Conn. 06880 (203) 227-0841		2040-H (with I/O)	April	2520-B3	Now	2050-H	Now	2050-I	Jan	2040-G	Now	2030-F	Now	For Sale or Lease <table border="0"> <tr> <td>2-2401-2</td> <td>Available</td> </tr> <tr> <td>1-2803-1</td> <td>Immediately</td> </tr> <tr> <td>4-2401-2</td> <td>Available</td> </tr> <tr> <td>1-2803-1</td> <td>February</td> </tr> <tr> <td>800 BPI</td> <td></td> </tr> </table> Tape Drives Dresser Industries, Inc. Box 1407 Houston, Texas 77001 Telephone H. Coons, For information (713) 781-5900 Ext. 2215	2-2401-2	Available	1-2803-1	Immediately	4-2401-2	Available	1-2803-1	February	800 BPI	
2040-H (with I/O)	April																									
2520-B3	Now																									
2050-H	Now																									
2050-I	Jan																									
2040-G	Now																									
2030-F	Now																									
2-2401-2	Available																									
1-2803-1	Immediately																									
4-2401-2	Available																									
1-2803-1	February																									
800 BPI																										

SYSTEM 360/370 A business relationship you can't afford to be without... • Lease Terms to Fit Your Needs • Field Engineering Support • Systems Engineering Support • Well Trained Marketing Staff • Buy and Sell 360s • Subleasing Member, Computer Lessors Association Dearborn Computer Leasing Corporation a subsidiary of Dearborn-Storm 4849 North Scott Street, Schiller Park, Illinois 60176 Area 312 671-4410		dearborn computer leasing corporation	
We Need: 360's All Models 2314-I 1419-I 2821-I 2311-I		BUY SELL LEASE FOR BETTER VALUE LOOK TO:	Available: 360/40-128k 360/50-Core-256k 360/30-64k System 2540, 2821-I, 1403 N1 2803 II, 2-2401 VI, 2314 I,
cac COMPUTER ACQUISITIONS COMPANY P.O. BOX 80572 ATLANTA GA 30341 • (404) 458-4425			

370 LEASING

- new or installed CPU's
- flexible upgrade capabilities
- guarantee savings on upgrades

Analysis International Co., Inc.

consultants • marketing • leasing
4530 park rd charlotte n.c. 28209 area code 704 523 6912

BUY-SELL-LEASE

System/360's 1130's

Are you considering buying, selling, or leasing your data processing equipment? Consider Econocom. Our proven staff of highly trained professionals can assist you in all areas — Buy, Sell or Lease. Contact us today — let us show you how we can help you gain the most from your data processing investment.

FOR SALE

360/40-128K or 256K	1130-2C-16K	360 20
2 Channels	=3616	Card Disk
1401 Compatibility	=3854	& Tape
1403-N1, 2540, 2821	=4454	Configurations Available

 **ECONOCOM** A DIVISION OF LOCKHEED CORPORATION
1000 N. 9th St., Suite 100, P.O. Box 100
Memphis, Tennessee 38101 • Phone: 901-521-1100

Computerworld Sales Offices

Vice President — Sales
Neal Wilder
Sales Administrator:
Dorothy Travis
COMPUTERWORLD
797 Washington Street
Newton, Mass. 02160
(617) 332-5606

Northern Regional Manager
Robert Ziegel
COMPUTERWORLD
797 Washington Street
Newton, Mass. 02160
(617) 332-5606

Mid. Atlantic Regional Manager
Donald E. Fagan
COMPUTERWORLD
225 West 34th Street
Suite 1511
New York, N.Y. 10001
(212) 594-5644

Los Angeles Area:
Bob Byrne
Robert Byrne & Assoc.
1541 Westwood Blvd.
Los Angeles, Calif. 90024
(213) 477-4208

San Francisco Area:
Bill Healey
Thompson/Healey Assoc.,
1111 Hearst Bldg.
San Francisco, Calif. 94103
(415) 362-8547

Japan:
Yoshi Yamamoto
Nippon Keisoku Inc.
P.O. Box 410
Central Tokyo, Japan

BUY SELL SWAP

FOR SALE
IBM 360/370 UNITS

2702 Transmission Control
20 Data Set Lines
3 Local Lines
2311/2841 Disk Drives and Control
2420-7 Magnetic Tape Drive
2401-5 Magnetic Tapes
Plug Compatible MAI 2405
Dual Density Power Window SR 1500
Data Products Card Readers
1500/2000 CPM 1443 N1 Printer
CALL: (617) 227-8634
We BUY any Computer Peripheral or Teletype Send for FREE Price List
American Used Computer Corp.
15 School St.
Boston, Ma. 02108

**FOR SALE OR LEASE**

360/20/30/40 CPU's & Systems 1401, 1440, 1620, 2311, 2841, Univac 9200 System All Types Unit Record

LEASE OR LEASE PURCHASE

Two 1401-16K with 729's
One 1401-12K with 729's

CALL or WRITE

Data Automation Services, Inc.
4858 Cash Road
Dallas, Texas 75247
(800) 527-6148
318 W. 28th Street
Los Angeles, Calif. 90007
(213) 747-0587
7750 N.W. 7th Avenue
Miami, Fla. 33150
(305) 693-3911

BUY SELL SWAP

FOR SALE OR LEASE

IBM 2311
Disk Drives
IBM 1401
4K to 12K Systems
Savings
in the Thousands.

D.P. Equipment Marketing Corp.
260 W. Broadway, N.Y. N.Y.
CALL (212) 925-7737 Ext. 1

FOR SALE

Calma Digitizer Model 485
Calcomp Tape Drive Model 780
Honeywell Series 200 Model 125

Romelan Industries
P.O. Box 655
Santa Clara, CA 95050
(408) 248-7282

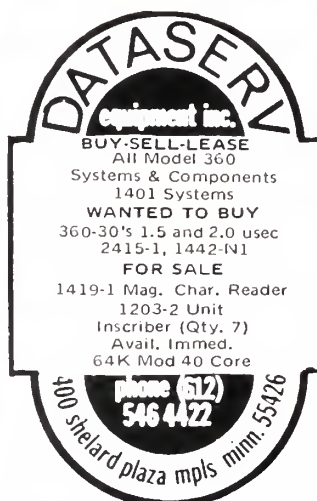
We buy and sell

G.E. computers and peripherals
Have on hand 22 400 Series CPU's. Also PC Cards and memories for 200 Series and 600 Series. We maintain most G.E. equipment.

Call Craig Hunter at
(801) 278-9006

or Doug Robinson at
(408) 275-9093

BUY SELL SWAP

**FOR SALE**

360/40G

2314-1

2540

1403-N1

Write:
CW Box 3755
60 Austin Street
Newton, Mass. 02160

WANTED TO PURCHASE

1442 Card Punch

Model N1 or N2

CIS CORPORATION
700 East Water Street
Syracuse, New York 13210
(315) 474-5776

**FOR SALE**

2314-1, Feb.

2415-2, Dec.

2030-F, Feb.

2044-G, Dec.
With Commerical Feature

1401-C6 Syst.
Disk &/Or Tape

WANTED

1440 System
Disk &/Or Tape

ACS Equipment Corporation
8928 Spring Branch Drive
Houston, Tx 77055
(713) 461-1333

FOR SALE

HONEYWELL
200, 1200 and 1250
CPU's MEMORY
PERIPHERALS

Examples
8K Memory
Additions \$7500
204B-2 20KC
Tape Drives \$4000
And Many More
IMMEDIATE DELIVERY
CALL: (617) 227-8634

We BUY any Computer Peripheral or Teletype Send for FREE Price List
American Used Computer Corp.
15 School St.
Boston, Ma. 02108

BUY SELL SWAP

1620

Card and Disk Systems

FOR SALE

Available Immediately

Call for our special low prices
CMI Corporation
16225 E. Warren Avenue
Detroit, Michigan 48224
(313) 889-0440

NEED TO BUY

360/20 8K Card System
360/30 16K-32K-64K
IBM Core Boxes
360/30-40-50

Computer Sales, Inc.
2809 N.W. Expressway
Oklahoma City, Okla. 73112
(405) 848-7181

WANTED

IBM 2560

With or W/O Print
Data Service Ctr., Inc.

P.O. Box 2540
Toledo, Ohio 43606
(419) 479-5304



Sell - Rent - Buy
HP-2000 COMPUTER SYSTEMS

Including ...
• Hardware
• Software
• Peripherals
• Support Service

Contact Larry Schmieder
(201) 672-6000 or write to...
Computer Solutions Inc.
PO BOX 10181 EL PASO, TEXAS 79901

BUY SELL SWAP

FOR SALE

THE CITY OF NEW ORLEANS
WE INVITE BIDS
FOR THE FOLLOWING
COMPUTER EQUIPMENT

1 Only IBM 2702 Transmission Control Unit With Nine (9) Data Set Line Adapters.
33 Only 407 Control Panels (910)

1 Only 407 Board Rack
1 Only Sorter Rack
103 Reels 556 B.P.I. Magnetic Tape

BIDS WILL BE RECEIVED UP TO 11 A.M., JAN. 10, 1973.
OFFICIAL BID FORM AVAILABLE ON REQUEST.

George Will III
Purchasing Agent
Room BE 10, City Hall
New Orleans, La. 70112

IBM 360
BUY...SELL...LEASE
CALL

CEI

IBM 360/30 E&F CPU's (Dec. & Jan.)
IBM 360/40 CPU's (Dec. & Jan.)
1419 Reader, 2314-A6 Spindle
2401 Tapes 1, 2, 3 & 6
IBM 360/50H (Jan.)
IBM 360/30 32K Core 1.5 mic.
Complete I/O Set

CEI - The ORIGINAL
COMPUTER EXCHANGE
THE COMPUTER EXCHANGE INC.
11 GRACE AVENUE,
GREAT NECK, N.Y. 11021
516 466-6500

Before you Buy—Lease—Sell

360/65

or any 360 or 370 equipment
call or write



COMDISCO, INC
2200 East Devon Avenue
Des Plaines, Illinois 60018
Telephone 312-297-3640

we have a new concept in leasing

360 MARKETPLACE
BUY·SELL·LEASE

360 30-64k cpu

360 40-128k or 256k

360 50 core 256k

2301 DRUM STORAGE 2820 CONTROLLER



COMPUTER INDUSTRIES

3570 American Drive
Atlanta, Georgia 30341
404/451-1895

WE ALSO HAVE TAPE
DRIVES, DISK DRIVES
& OTHER PERIPHERAL
EQUIPMENT.

Offices In Chicago
222 E. Wisconsin Avenue
Lake Forest, Illinois 60045
(312) 295-2030

360/65

360/651 available December delivery. Will also supply as 360/65H. Lease, sale, or lease with purchase option.

IPS **IPS COMPUTER MARKETING CORP.**

467 Sylvan Ave., Englewood Cliffs, N.J. 07632 (201) 871-4200

360/50

360/501 available for immediate delivery. Will sell, lease, or lease with purchase option. CPU available as 50H or HG. 128K or 256K core also available.

FOR SALE BY OWNER

370/145 213 or 262K
December

360/30 32K
January

360/40 128K
Full complement of features
December

360/30 32K
Full complement of features
February

CONTINENTAL INFORMATION SYSTEMS

700 East Water Street
Syracuse, New York 13210
(315) 474-5776

FOR LEASE or SALE

256K 360/40

also available as 128K or 192K

READY TO SHIP

Two Selector Channels, Decimal Arithmetic, Floating Point Arithmetic, 1401/1460 Compatibility, Storage Protect, And 1052-7 Console.

Outstanding Lease Plan, Or Outright Purchase

LUNCEFORD & ASSOCIATES **Valley View Bank Bldg.**
(913) 381-7272 **Overland Park, Kan. 66212**

BUY SELL SWAP	BUY SELL SWAP	BUY SELL SWAP	BUY SELL SWAP	BUY SELL SWAP																																				
SALE/LEASE Available January 15 2020 BC1-12K 2203 A1-144 Pos. 2560 A1-2 Lines Print Available Now 2020 BC2, 2520 A2 2501 A1, 1403-2 Available Now 2020 D2, 2203 A1 2560 A1 Full Line Unit Record Equipment 029, B22, 059, 083 CROSS COMPUTER CORP. 505 Northern Blvd. Great Neck, N.Y. 11021 Call Bob Ottes, Bill Dries (516) 487-9812 In Philadelphia Call Jay Goldfarb (215) 568-6620 SYSTEMS 3/360/370 LEASING FINANCING AVAILABLE	IBM 360/40 CPU FOR LEASE WITH 4427, 3237, 6980, 6981, 7520, 4457, 7920, 1052-7 Available Late December CALL US FOR OUR LOW RATES The Computer Exchange Inc 11 Grace Ave. Greatneck, N.Y. 11021 (516) 466-6509	FOR SALE 7074 System w/Tapes 360/50's 360/40's 360/30's 2404-2 Tape & Control Also Immed. Available: For Sale or Lease 1401-C3 System Frank J. Williams  BOOTHE COMPUTER MARKETING, INC. 555 California St. San Francisco, Calif. 94104 (415) 989-6580	FOR SALE GE 225 16K word CPU, Auxiliary Arith- metic, Card Punch, Card Reader, 900 LPM Printer, 2 Tape Con- trollers, 8 Tape Handlers Mainte- nance Contract Available. Finserv Computer Corp 1162 Erie Boulevard Schenectady, New York 12305 (518) 377-8831	For Lease by Owner 360/40 G, GF or H Available mid-January 1973 Attractive rates for one year or longer Peripherals also available. EDP Resources Inc. One North Broadway White Plains, N.Y. 10601 (914) 428-3804																																				
FOR SALE OR LEASE 024-\$350; 026-\$1200; 056-\$350; 077-\$750; 082-\$900; 083-\$2700; 085-\$1900; 402-\$1300; 403-\$1500; 407-\$4200; 514-\$1300; 519-\$1600; 548-\$2000; 552-\$1700; 557 \$3500; 602-\$400; 2311 (1)-\$5,500 729 (5)-\$4500; 729 (6)-\$6000; 2311 (1)-\$6500; 1448 (1)-\$1500; 1401-C6-16K system-\$40,000. THOMAS COMPUTER CORP. 625 N. Michigan-Suite 500 Chicago, Ill. 60611 (312) 944-1401	we buy and sell IBM Computer Systems & Unit Record Machines NCR 31-32-33 Etc. Burroughs Fridens  403 Broome Street New York, N.Y. 10013 (212) 966-5931	For Sale By Owner Univac 9200 Processor 3030-00 250 LPM Printer 96 Print Position F 0868-01 132 Print Position 7007-00 Memory 8K Bytes 0711-00 Card Reader 400 CPM 0603-04 Card Punch 7--200 CPM Above Equipment Currently Under Univac Maintenance Contract Sippican Corp. Rt. 6 Marion, Mass. 02738 (617) 748-1160	FOR SALE UNIVAC 9200 8K CARD SYSTEM P.O. BOX 4078 HAYWARD, CA. 94544	 BUYING? SELLING? Contact: GREYHOUND Write: Manager of Brokering Greyhound Computer Corp. Greyhound Tower Phoenix, Arizona 85077 or Call (800) 528-6024 Toll Free FOR SALE 360 SYSTEMS WANTED 30's, 40's and 2314's																																				
Current Inventory SALE All this Unit Record Equipment in stock and ready to ship at money sav- ing sale or lease prices. RARELY OFFERED 046. 029, 059, 407, A3, 548, 557, 087, 088 OTHER FINE MODELS 024, 026, 056, 077, 085, 402, 403, 407, 514, 519, 523, 552, 602, 604, 521, 826  D.P. Equipment Marketing Corp. 260 W. Broadway, N.Y. N.Y. (212) 925-7737 Ext. 1	Disk Packs and Cartridges Wanted to Buy We also Sell and Lease New and remanufactured Brand Name Disk Packs and Disk Cartridges. Used Computers Inc. 14 S. Bryn Mawr Ave. Bryn Mawr, Pa. 19010 Attn: Neil L. Houghton (215) LA5-4456	COMPUTER SAVINGS BUY-SELL-LEASE DEI DATA EQUIPMENT INC. 3306 W. Walnut Suite 304 Garland, Texas 75042 (214) 272-7581	360 System For Lease 2030-65K CPU (Loaded) 1051, 1052 2540, 2821, 1403 (N1) 2841, 2311's & 2401's CALL OR WRITE: DATA AUTOMATION 4858 Cash Road Dallas, Texas (214) 637-6570	Time for Sale NEW YORK SYSTEM 3, 360-20 Time Key punching Card & Program Conversion Reasonable Rates ANCHOR SYSTEMS, INC. (212) 343-1715																																				
FOR SALE DATA COMMUNICATIONS EQUIPMENT <table border="1"> <thead> <tr> <th>Equipment</th> <th>Quantity</th> <th>Price Per Unit</th> </tr> </thead> <tbody> <tr> <td>Carterfone DM 328 Originate-Acoustic/ Hardwire (New)</td> <td>100</td> <td>\$ 99.50</td> </tr> <tr> <td>Carterfone DM 318 Originate-Hardwire (New)</td> <td>100</td> <td>89.50</td> </tr> <tr> <td>Omnitac 701A-Acoustic-Hardwire (New) ..</td> <td>80</td> <td>210.00</td> </tr> <tr> <td>Sangamo T-103FS Originate/Answer-Hard- wire (Reconditioned)</td> <td>90</td> <td>149.50</td> </tr> <tr> <td>Sangamo T201A Data Set (New)</td> <td>1</td> <td>400.00</td> </tr> <tr> <td>Western Electric 103A2 (New)</td> <td>2</td> <td>300.00</td> </tr> <tr> <td>Western Electric 801C (New)</td> <td>1</td> <td>400.00</td> </tr> <tr> <td>Teletype®-Model 28 KSR (Reconditioned)</td> <td>12</td> <td>500.00</td> </tr> <tr> <td>Delta Data Telterm II (New)</td> <td>28</td> <td>2,450.00</td> </tr> <tr> <td>Datapoint 3330 (Reconditioned)</td> <td>25</td> <td>1,850.00</td> </tr> <tr> <td>Friden AP-6 Add Punch (Like New)</td> <td>5</td> <td>\$1,700.00</td> </tr> </tbody> </table> ALL EQUIPMENT GUARANTEED FOR 30 DAYS Vardon & Associates 930 N. Beltline, Suite 140, Irving, Texas 75602 (214) 252-7502	Equipment	Quantity	Price Per Unit	Carterfone DM 328 Originate-Acoustic/ Hardwire (New)	100	\$ 99.50	Carterfone DM 318 Originate-Hardwire (New)	100	89.50	Omnitac 701A-Acoustic-Hardwire (New) ..	80	210.00	Sangamo T-103FS Originate/Answer-Hard- wire (Reconditioned)	90	149.50	Sangamo T201A Data Set (New)	1	400.00	Western Electric 103A2 (New)	2	300.00	Western Electric 801C (New)	1	400.00	Teletype®-Model 28 KSR (Reconditioned)	12	500.00	Delta Data Telterm II (New)	28	2,450.00	Datapoint 3330 (Reconditioned)	25	1,850.00	Friden AP-6 Add Punch (Like New)	5	\$1,700.00	AVAILABLE 480 Square Feet of Raised Floor J.F. Longinotti (415) 445-7439 San Francisco, Calif.	Tape Drive Specialist We Buy, Sell and Lease Used IBM 360 Tape Drives and Controllers For more information, Call or write: Mr. Harvey N. Berlent HNB Marketing Co. 3505 Knight Street Oceanside, N.Y. 11572 (516) 536-8338	On a computer, nothing wears down but the price	WANTED IBM 2314 IBM 1419 IBM 360/20-8K FORSYTHE McARTHUR Twenty-first Floor 919 North Michigan Avenue Chicago, Illinois 60611 Telephone: (312) 943-3770
Equipment	Quantity	Price Per Unit																																						
Carterfone DM 328 Originate-Acoustic/ Hardwire (New)	100	\$ 99.50																																						
Carterfone DM 318 Originate-Hardwire (New)	100	89.50																																						
Omnitac 701A-Acoustic-Hardwire (New) ..	80	210.00																																						
Sangamo T-103FS Originate/Answer-Hard- wire (Reconditioned)	90	149.50																																						
Sangamo T201A Data Set (New)	1	400.00																																						
Western Electric 103A2 (New)	2	300.00																																						
Western Electric 801C (New)	1	400.00																																						
Teletype®-Model 28 KSR (Reconditioned)	12	500.00																																						
Delta Data Telterm II (New)	28	2,450.00																																						
Datapoint 3330 (Reconditioned)	25	1,850.00																																						
Friden AP-6 Add Punch (Like New)	5	\$1,700.00																																						
IBM EQUIPMENT — SALE OR LEASE <table border="1"> <thead> <tr> <th>360/20 D-2</th> <th>360/20 C-1</th> <th>360/20 B-1</th> <th>360/20 C-1</th> <th>2040 GF</th> <th></th> <th></th> </tr> </thead> <tbody> <tr> <td>2560</td> <td>2560</td> <td>2263</td> <td>2203</td> <td>2 Sel</td> <td>2/1/73</td> <td></td> </tr> <tr> <td>(6 p.p.)</td> <td>(2 p.p.)</td> <td>(24 Addit.)</td> <td>(24 Addit.)</td> <td>1052</td> <td>Del.</td> <td></td> </tr> <tr> <td>1403</td> <td>2203</td> <td>2501</td> <td>2501</td> <td></td> <td></td> <td></td> </tr> <tr> <td>2501</td> <td>2501</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> FREE ESTIMATES ON ALL YOUR EQUIPMENT SIMPLICITY COMPUTER CORP. 257 West 39th Street New York N Y 10018 • (212) 695-3010 Attention: Mr. Marlow	360/20 D-2	360/20 C-1	360/20 B-1	360/20 C-1	2040 GF			2560	2560	2263	2203	2 Sel	2/1/73		(6 p.p.)	(2 p.p.)	(24 Addit.)	(24 Addit.)	1052	Del.		1403	2203	2501	2501				2501	2501						For Sale NCR 400 Accounting Machine Recent conversion to Service Bureau computerized billing necessitates the sale of a like New NCR 400 Magnetic Ledger Card, Tape-Driven Billing Ma- chine. Cost new approximately \$18,000.00. Opportunity for village or small city to move to mechanized accounting and/or billing. Machine can be used for appropriation and payroll, Inventory Control, Capital Improvements, Income Tax, etc. Submit sealed bids to: City Manager, City of Xenia, 101 N. Detroit St., Xenia, Ohio 45385. Equipment may be examined any time Monday through Friday, 8:00 a.m. to 5:00 p.m. Deadline for bids: January 15, 1973 For information call M.V. Ross, 1-513-372-7611, Ext. 44 City Reserves Right to Reject Any and All Bids	For Lease by owner 360/30 E or F Available mid-January 1973. Attractive rates for one year or longer. Peripherals also available. EDP Resources Inc. One North Broadway White Plains, N.Y. 10601 (914) 428-3804	360's WANTED 360/20 D2 with the following features: 4658, 1580, 8082, 8099, 2650 A1 MFCM w/1575, 2203 A1 Printer w/5558, 2415-2 Tape control w/four 9-track drives, February delivery. 360/30 65K 1.5 us fully loaded CPU with full I/O, in- cluding 1100 lpm printer, Two 2401 II 80 BPI Tape Drives plus two 2311's, February de- livery.  TBI Equipment Div. Time Brokers, Inc. 500 Executive Blvd. Elmsford, N.Y. 10523 (914) 592-4065 Nationwide broker/dealers of DP equipment & computer time Atlanta Baltimore Boston Chicago Elmsford N.Y. Los Angeles New York City Philadelphia and Washington D.C.	WE WILL RUN YOUR JOBS For \$50.00 Per Hour On Our 360/40 or Our 370/145 360/40 128K, 3-2314 Spindles, 3-2400 Tapes, N1 1403 Printer, 2540 Card Read Punch, 370/145 131K, 6-2314 Spindles, 4-3420 Tapes, N1 1403 Printer, 2540 Card Read Punch CW Box 3756 60 Austin St. Newton, Mass. 02160	
360/20 D-2	360/20 C-1	360/20 B-1	360/20 C-1	2040 GF																																				
2560	2560	2263	2203	2 Sel	2/1/73																																			
(6 p.p.)	(2 p.p.)	(24 Addit.)	(24 Addit.)	1052	Del.																																			
1403	2203	2501	2501																																					
2501	2501																																							
DON'T BE MISLEAD AS WE NEED URGENTLY! for New Hospital IBM Type 026 and 029 Key Punches Will Pay \$200 to \$500 over current Market Price Will pick up anywhere in USA or Canada Phone Collect (313) 584-6420 ask for Jack	SUBLEASE AVAILABLE 24K 360/22, 1443 Printer, 1442 CRP, 2-2311 BLOCK 20 meterhrs/mo for 12 mos. ACCESS: Mon-Fri, 2 to 5 PM LOCATION: Queens, New York City PRICE: \$4,200.00, payable monthly Call Mr. Shapiro at (212) 275-3661																																							

TIME FOR SALE	TIME FOR SALE	TIME FOR SALE	SOFTWARE FOR SALE	SOFTWARE FOR SALE
NEW YORK We Will Do Your Key punching At 30% Less Than You Currently Pay Contact: CW Box 3757 60 Austin Street Newton, Mass. 02160	MASSACHUSETTS WE'LL PUT AN IBM 360/65 ON YOUR DESK.... That will take the place of one of our RJE terminals requires and with it, you're plugged into the largest Data Center in New England. Whatever your needs: • Conversion • Production • Overflow PHI's low-cost remote batch processing network links you directly to our powerful IBM System 360/65 with: • 1,500,000 bytes of core • 986,000,000 bytes of mass storage • RJE HASP Operation • A complete library of program languages and utilities And, we'll support most terminals, leased-line or dial-up. Contact Michael Zuromskis at (617) 648-8550 for a demonstration at any one of our offices.  PHI COMPUTER SERVICES, INC.	ILLINOIS IBM 360/370 USERS Computer Time Available 370/135 1.5 MEG, 3330, 2 2314's, 12 3420 Tapes 360/65 1.5 MEG, 3330, 2 2314's, 10 3420 Tapes, 1403 N1, 2540, 3211 360/30 512K, 2314K, 6 3420 Tapes, 1403 N1, 2540 360/30 64K, 6 Tape, 5 2311's, 1403 N1, 2540 For Further Information Call Paul Sarris or Ron Ellis (312) 346-1331 Computer Research Co. 200 N. Michigan Ave. Chicago, Ill. 60601 Largest Computer Time Sales Co.	 LOOKING FOR SOFTWARE? Free Software Search and Package Appraisal Service Our job is to help you locate the software packages which best meet your needs. There is no charge to you for this service. Write on your company letter-head or call: Systems Exchange Co. 361 Lytton Avenue Palo Alto, Calif. 94301 (415) 328-5490 	Try EASYTRIEVE free for 30 days New generalized retrieval and reporting package. IBM 360/370 DOS or OS. Free form English language. No compile, no assemble, I/O speed. Over 75 satisfied users. \$6,000. A product of: Ribek Corporation Montgomery Center 8630 Fenton Street Silver Spring, Md. 20910 (301) 587-0115 Also available through: International Systems King of Prussia, Pa.
 COMPUTER TIME AVAILABLE Babbage Systems, Inc. New Expanded Facilities 345 Park Avenue, NYC (at 51 Street) (2) 360/30 65K (1) 360/40 128K Model VI Tapes, 2314 & 2311 Disks, 2540 Readers, 1403 N1 Printers. Available on all three systems. • REASONABLE RATES • ALL SHIFTS & WEEKENDS AVAILABLE Call (212) 688-1111	ILLINOIS IBM 360/50 USERS: The Cost of Computer Time Just Went Down (and the quality went up!) 360/50 512K, 7-2401 M6 (9T, 800/1600BPI), 2-1403 N1, 1-2540, 2314 8 AM-8PM 8PM-8AM Weekdays \$65/HR \$55/HR Weekends \$45/HR 1403 OFF-LINE PRINTING Call Dan Grey or John Davidson (312) 583-5410  COMPUTER SERVICE DIVISION 5320 N. Kedzie Ave. • Chicago, Ill. 60625	NEW JERSEY S/360/50/40/30 1287 2671 Paper Tape Reader ALL SHIFTS Call: Roy Einreinhofer Popular Services, Inc. (201) 471-2577	MMS GENERAL LEDGER is hard at work for over 40 of the biggest US corporations* TO FIND OUT WHAT THEY KNOW THAT YOU DON'T, CALL: Boston 617-272-2970 New York 212-972-9540 Chicago 312-256-2250 Atlanta 404-255-0039 Los Angeles 213-622-3996 San Francisco 415-421-0426  Software International Corporation 279 Cambridge Street Burlington, Ma. 01803 *so are Accounts Receivable, Accounts Payable, Inventory Management packages.	CATS-A/R OPEN ITEM ACCOUNTS RECEIVABLE Features include: • Billing • Automatic Cash Application • Inventory Control • Multi-company Systems Schedule Under control of the CATS MASTER Systems Controller, provided FREE with the license of any of the CATS programs. Also available are: Accounts Payable - Cash Requirements and Accounts Receivable - Balance Forward.  For information contact: Tom Leopold, President COMPUTER WARES, INC. P. O. Box 31205, Birmingham Ala. 35222 - Phone 205/595-0511
TIME FOR SALE NASSAU COUNTY 370/135, 96K REL 27 DOS 2540, 1000 CPM Read/Punch, 1403/N1 1100 LPM, Printer 2314 with 3 spindles, 2501 Reader 4-3420 Dual Density Tape Drive 60/120KB. All Shifts \$60/hour remote or hands-on Also 1287 Optical Scanner with handwriting feature - Negotiable rate. 9-5 p.m. Call (516) 921-7700 X 331 After 5 p.m. Call (516) 921-3182	MASSACHUSETTS Who's WYLBUR?? Wylbur is a low-cost, on-line conversational remote processing system that gives you the convenience of time sharing without its high overhead. With WYLBUR, you enter data on a low-cost terminal in a conversational mode for subsequent remote batch processing. WYLBUR terminals can operate singly or in clusters around a high-speed RJE Station. Where does WYLBUR live? At PHI - for a free demonstration, contact Michael Zuromskis at (617) 748-8550.  PHI COMPUTER SERVICES, INC.	CONNECTICUT Computer Time Sales • • All Shifts • • 360/30 (2) 64K 2314-Disk 360/40 - 128K 800/1600 Tapes 360/40 - 256K 1403 Printers 360/50 - 512K 360/65 - 1256K  UNIROYAL Call Collect George Errico (203) 573-2587	asystance THE FINEST GENERAL LEDGER AND FINANCIAL REPORTING SYSTEM AVAILABLE Featuring: • Conventional Report Generator • Graphic Report Generator • Matrix Report Generator • Responsibility Reporting • Flexible Budgeting Module • Multiple Currency Version to accommodate foreign subsidiary accounting asystance 2610 Wycliff Road Raleigh, North Carolina 27607 (919) 782-7300 New York: (212) 586-5977 Chicago: (312) 256-1810	Is \$960 Too Cheap? How About \$62/Month? That's all we charge for our SUPER/PAY Payroll System. A very comprehensive system ordered by over 30 top firms in the past year, who liked SUPER/PAY's features as well as price. -All COBOL - 48K or above -Variable or fixed input -Disk or tape-IBM or others -State and local taxes -DOS or OS -Unlimited deduction & earnings -Vacation and sick leave acctg. -Skill & education profile -Outstanding documentation -30 day free trial Try the system as others have and we know you will like it. Ask about our General Ledger Accounts Payable & Receivable available on the same plan. Call or Write Today Dataease Corporation 6430 Sunset Blvd. Los Angeles, Calif. 90028 (213) 461-4888
	360/65 512K Excellent off-prime time Availability at \$90/hour full system Lower third shift rates sixteen 2314 spindles Twelve 1600 BPI 2401 120KB Tape Drives Three 1403 N1 Printers, 2540 Full features Loop location  TIME BROKERS, INC. 75 East Wacker Drive Chicago, Ill. 60601 (312) 641-1970 Nationwide brokers of computer time and DP equipment Atlanta, Baltimore, Boston, Chicago, Elmford, N.Y., Los Angeles, New York City, Philadelphia and Washington, D.C.	Software for Sale AUTOCODER & SPS TRANSLATED AUTOMATICALLY to BAL & PL/1 THE TOTALTRAN SYSTEM ... The most economical, practical and quickest method of converting to the 3rd and 4th generation. 3 SERVICES OFFERED: 1. 1400 Object to clean source de- compilation 2. 1400 Clean source to BAL translation 3. 1400 Clean source to PL/1 translation Contact: W. Small, President  CPU MANAGEMENT ADVISORY CORP. 853 Broadway, N.Y. 10003 (212) 777-7722	TAPE LIBRARY MANAGEMENT SYSTEM from Gulf Computer Sciences, Inc. — IF YOU — • ever run short of scratch tapes • have off-premises tape storage problems • ever mislabel tapes • have costly reruns due to I/O errors THEN YOU NEED TLMS ***** TLMS interfaces with OS/MCS/SMF to give instantly updated status of standard labeled tapes. PLUS external labels generated on-line, tape history information, expiration listings, remote storage listings, and much more! CONTACT Gulf Oil Computer Sciences Incorporated P.O. Box 2100 Houston, Texas 77001 (713) 228-7040	
	NEED TIME 360/65 DOS 512 K 12 Tape Drives 16 2314 Disk Drives On and Off Line Printers Interested in Selling Block Time Five or Seven Days a Week Located in Chicago Central Business District Excellent Physical Facilities Will Provide Office & Storage Call (312) 225-6800, Mr. Zimmer			

Anderson Jacobson Earnings Rise 65% in Half, Revenues Set Record

SUNNYVALE, Calif. — Anderson Jacobson, Inc. chalked up its fifth consecutive new high for revenues in a six-month period, with earnings up 65% over the year-ago period. Incoming new orders ran 32% ahead of orders for the same period last year, according to the firm.

Revenues for the half year ended Sept. 30 reached \$2.5 million compared with \$2 million in 1971, while earnings, including a \$36,694 special credit, climbed to \$162,694 or 6 cents a share, compared with \$76,061 or 3 cents a share in the 1971 period.

A gain in second-quarter revenues and earnings was achieved despite the fact that outright sales in the 1971 quarter were "unusually high" because of a bulge in OEM sales, according to President Raymond E. Jacobson.

In the three months, revenues rose to \$1.3 million from \$1.2 million, and earnings to \$75,182

or 3 cents a share, from \$52,926 or 2 cents a share.

Jacobson explained to shareholders that Anderson Jacobson's product line of couplers, modems and keyboard printer terminals is not computer peripheral equipment in the true sense of the word, but the firm is more a part of the "data communications" world.

In commenting on the industry, Jacobson said: "Even considering AT&T, which does build modem equipment, there are, at this point, no strongly dominant companies in the computer terminal and data communications field as there are in the computer mainframe and peripheral field."

"We believe, therefore that while competition is keen in our business, independent companies like ours can compete very effectively and that we shall grow substantially."

Inforex Has Profitable 9 Months

BURLINGTON, Mass. — Key-to-disk maker Inforex has put two profitable quarters back to back, and showed a profit for the nine months ended Sept. 29.

With a healthy boost from \$1.9 million in third-quarter sales to Leasing II, Inforex earned \$525,220 or 23 cents a share, compared with a loss of \$1.4 million or 74 cents a share in the comparable 1971 period.

The 1972 figure includes a \$278,000 tax credit.

Revenues for the quarter rose to \$6.1 million from \$1.2 million in the same 1971 period.

Rental Revenues Up

Rental and service revenues for the quarter were \$2.5 million, up 25% over the previous quarter, and over three times the amount for the third quarter last year, President T.B. Horgan noted.

Order backlog totaled \$10.7 million in sales value at the end of September, compared with \$8.2 million a year ago.

In the nine months, earnings, including a \$453,000 tax credit,

totaled \$535,083 or 23 cents a share, compared with a loss of \$3.8 million or \$2.05 a share in the 1971 period. Revenue rose to \$15.8 million from \$2.8 million a year ago.

Remcom Sets Financing

GARLAND, Texas — About \$17 million in financing has been arranged through Transamerica Computer Corp. and Industrial Leasing Corp. for Remcom Corp., a subsidiary of SCS Corp.

Under the agreement the two firms will purchase Remcom equipment, subject to leases with Remcom customers. Remcom will retain distribution and service responsibilities.

The lease financing will cover Remcom's production of remote batch terminals from now throughout 1973, SCS said.

The agreement includes about \$16 million in lease financing from the two firms and the sale of \$750,000 of convertible debentures to Transamerica.



if it's
a matter
of speed

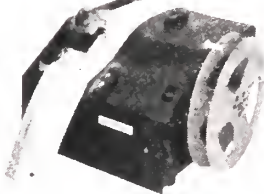
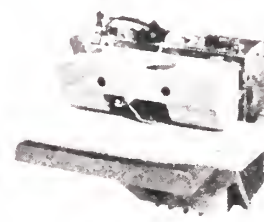
ROYTRON

Speed, in I/O devices, is directly related to price.

That's why we offer you over 60 ROYTRON Models. Paper Tape and Edge Punched Card Punches rated at 50, 60 and 75 cps. Readers rated from 1 to 1000 cps.

The lower the speed, the lower the price.

So, why buy more speed than you really need?



For more information
call Frank Misiewicz
OEM Products
(201) 935-2200



OEM PRODUCTS DIVISION
LITTON ABS

Automated Business Systems
600 Washington Avenue, Carlstadt, N. J. 07072

CONVERSION

2 MIC 1.5 MIC

We can Convert your Model 30
At a Price You Can Afford

STORAGE PROTECT INTERVAL TIMER

Available For Your Model 30

1401 FEATURES

We Have Most 1401 Features
Including 1406 Model Changes

Contact: R. J. DeFrancis

COMMA CORP.

1250 Broadway N.Y., N.Y. 10001
Tel: (212) 239-7250



Give your processor the punch it needs! Documation's new P100 Card Punch.

Our P100 features the reliability, ease of operation, and economy that have made Documation's card readers the Standard of the Industry.

Side friction picking—cam driven punching—automatic data verification—simple interfacing—full TTL logic—straight line card travel—and more. They're all here in our new P100 Card Punch.

You get hopper after hopper of error-free cards. Our large capacity hopper and stacker (1000 cards) lets you load and unload on the fly. Punches at the rate of 100 cards a minute or 300 cards a minute when fewer than 10 columns are punched.

The P100 Card Punch. Like our card readers—its gotta be great!



POST OFFICE BOX 1240
MELBOURNE, FLORIDA 32901
TELEPHONE (305) 724-1111
TWX 510-959-6286



Model/Feature	IBM Rental	NVC Lease
2050 1	\$22,983 00	\$9,600.00/mo.
6980		Min. 18 months
6981		
6982		
1052 7		
Avail. January 5, 1973		
Under IBM Maintenance Rate Includes Transp./Install. Write or Call Collect - Today It's our only, business		
COMPUTER SALES, INC.		

COMPUTERS NEED
U.C.P.*

*UNINTERRUPTIBLE COMPUTER POWER

SYSTEM 700UCP PROVIDES

- VOLTAGE CONTROL
- FREQUENCY CONTROL
- TRANSIENT CONTROL
- LINE ISOLATION
- BRIDGES UTILITY POWER INTERRUPTIONS



Get the facts on
UNINTERRUPTIBLE COMPUTER POWER

Frank White, 714-280-1111
POWER SYSTEMS & CONTROLS, INC.
P.O. BOX 27306 • RICHMOND, VIRGINIA 23261



Terminal Picture Cloudy as Sycor, Computer Terminal and Data 100 Report

Sycor Inc. reported record revenues for the third quarter, while Computer Terminal Corp. ended the year with a 40.8% reduction in losses, but a third terminal firm, Data 100, saw its third-period loss increase along with revenues.

Sycor third-quarter revenues reached \$3.8 million, compared with \$1.8 million last year. Earnings, including a \$140,000 tax credit, totaled \$275,100 or 12 cents a share compared with a \$557,400 or 43 cents-a-share loss in the year-ago period.

The nine-month period also showed a considerable turnaround, with revenues of \$9.9 million, an 83% increase over the \$5.4 million last year. Earnings, including a \$220,000 tax credit, rose to \$434,300 or 17 cents a share compared with a loss of almost \$1.5 million or \$1.11 a share for the 1971 period.

Sales to the export market and the planned expansion of domestic marketing have contributed equally to the increase in reve-

nues, according to President Samuel N. Irwin.

Computer Terminal cut its 1972 loss to \$2.2 million or 67 cents a share from \$3.8 million or \$1.25 a share in 1971. Revenues rose 82.5% to \$5.4 million from almost \$3 million for the year ended July 31, 1971.

Datapoint 2200 shipments accounted for 61.7% of the year's shipments and 87.4% of the year-end backlog, according to President J.P. Ray.

He projected the firm would soon be shipping Datapoint 2200 systems at a rate approximately 45% greater than the shipping rate at the end of July.

Computer Terminal expects to be operating profitably on a month-to-month basis before the end of the 1973 fiscal year, he added, noting also that the firm plans to obtain additional outside financing to further increase

its production and shipping levels.

Data 100 reduced its losses for the second consecutive quarter, but the third-quarter loss totaled \$1.3 million or 64 cents a share, including a \$200,000 special charge, compared with \$1 million or 82 cents a share in the 1971 period.

Revenues rose to \$2.7 million compared with \$1.1 million in the year-ago period.

In the nine months, revenue surged to \$6.8 million from \$2.4 million a year ago, while the loss totaled \$4.7 million or \$3.05 a share compared with \$3.1 million or \$2.67 a share in 1971.

Under an agreement for sales to Randolph Computer Corp., Data 100 expects to record transactions as sales, and "on this basis we expect to be profitable starting in the quarter ending Dec. 31, 1972."

Record Earnings Should Lift Itel

SAN FRANCISCO — Undaunted by a nine-month loss of \$2.6 million, and heartened by the on-schedule third-quarter earnings of \$232,000, Itel Corp. President Peter S. Redfield is predicting 1972 will be profitable.

Record earnings are expected in the fourth quarter, which will be sufficient to offset the 35 cents-a-share loss accumulated to date, he said.

Shipments of the 7330 disk drive system and returns from the packaged lease program are important factors in the upswing, he noted.

Itel's financial and DP service activities are growing in pre-tax income at a rate of better than 50% per year compounded, Redfield noted.

In addition, the sale of the Office Products Division has "stripped the decks of our major money loser," as well as contributed about \$20 million to the kitty, he said.

In the quarter, revenues declined to \$23.1 million from \$25.5 million a year ago, while earnings climbed to \$232,000 or 3 cents a share from \$77,000 or 1 cent a share.

The nine-month revenues also dropped, to \$62.7 million from \$81.1 million, and the loss totaled \$2.6 million or 35 cents a share compared with \$3.3 million or 46 cents a share in the year-ago period.

The 1971 results were restated to show separately the results of discontinued operations.

Nickels & Dimes

Consumer Marketing and Real Estate Services is expected to contribute about 80% of Computing & Software's 1972 profits, and almost two-thirds of revenues, according to President Norman E. Friedmann.

SSS

Potter Instrument anticipates sales in the \$50 million range for fiscal 1973. Profitability will depend on how rapidly the firm can move into full production of its new products, such as tape and disk drives and printers.

SSS

Computer Products had its fifth consecutive profitable quarter, with record revenue orders and backlog for the period ended Oct. 1. Earnings reached \$119,469 compared with a loss of \$68,384 a year ago.

SSS

Software International posted its fifth consecutive year of profitable operation.

SSS

Core production capacity at Data Products more than doubled in fiscal 1972 and is being doubled again in fiscal 1973.

SSS

Planning Research has obtained \$12 million of long-term refinancing with a group of institutional investors.

SSS

Com-Share had a larger operating profit in the first quarter ended Sept. 30 than in all of the preceding year. Earnings, including a \$62,000 tax credit, totaled \$123,473 compared with a loss of \$104,288 in the year-ago period.

SSS

Sold Out — A 279,383-share secondary public offering of Computer Automation Inc. common was snapped up at \$13.25 a share.

SSS

Rockwood Computer's DP leasing operation incurred a loss in the six months ended Sept. 30. Although the unit reduced the amount of equipment off rent, it experienced lower rates in remarketing this equipment.



The Novar 5-10 Touch Tone Telephone Translator makes it possible to use the millions of Touch Tone phones around the country as remote keyboards for data entry. One has simply to call a Novar data collection station (of which the 5-10 is a part), enter information by using the phone's 12 keys, then sign off by hanging up the phone. A quick, easy, inexpensive way to a nationwide network.



A Novar 5-50 or 5-60 tape terminal, a Novar 5-10 Touch Tone Telephone Translator, and a telephone company's 403-type data phone are all that's required for a complete data collection station. Receives and records data inputs, for computer processing, from Touch Tone telephones, nationwide. Twenty-four hours a day service too!

GTE INFORMATION SYSTEMS

2370 Charleston Road
Mountain View, California 94040
(415) 966-2272

GTE INFORMATION SYSTEMS

2370 Charleston Road
Mountain View, California 94040
(415) 966-2272



Computerworld Stock Trading Summary

All statistics
compiled, computed
and formatted by
TRADE*QUOTES, INC
Cambridge, Mass 02139

CLOSING PRICES THURSDAY, DECEMBER 7, 1972

E X C H	1972		CLOSING DEC 07 1972	WEEK NET CHANGE	WEEK PCT CHANGE
	RANGE (1)				

SOFTWARE & EDP SERVICES

O	ADVANCED COMP TECH	1- 3	2 3/8	+ 3/8	+18.7
A	APPLIED DATA RES.	3- 7	4 1/8	+ 7/8	+26.9
O	APPLIED LOGIC	1- 4	3 1/8	- 1/4	-7.4
N	AUTOMATIC DATA PROC	72- 99	95 1/2	+5	+5.5
O	BRANDON APPLIED SYST	1- 2	1	0	0.0
O	COMPUTER DIMENSIONS	5- 14	5	+ 1/4	+5.2
O	COMPUTER DYNAMICS	1- 4	1 1/4	0	0.0

O	COMPUTER NETWORK	3- 7	4 1/4	-1	-19.0
N	COMPUTER SCIENCES	4- 10	6 1/8	+1 3/8	+28.9
O	COMPUTER TASK GROUP	1- 2	1 1/8	- 1/8	-10.0
O	COMPUTER TECHNOLOGY	3- 8	3	0	0.0
O	COMPUTER USAGE	7- 14	9	+ 7/8	+10.7
N	COMP AUTOMOT REPORTS	5- 9	7 5/8	0	0.0
N	COMPUTING & SOFTWARE	14- 28	16 1/2	0	0.0

O	COMRESS	1- 3	1 1/4	+ 1/4	+25.0
O	COMSHARE	5- 10	7 1/2	+ 1/8	+1.6
O	DATATAB	4- 9	4 1/4	- 1/8	-2.8
O	EDP RESOURCES	2- 8	3	+ 1/4	+9.0
A	ELECT COMP PRUG	1- 5	1 5/8	+ 1/8	+8.3
N	ELECTRONIC DATA SYS.	43- 65	59 1/4	- 3/4	-1.2
O	INFORMATICS	5- 11	6	+1 1/8	+23.0

O	I.O.A. DATA CORP	1- 3	1	0	0.0
O	KEANE ASSOCIATES	4- 7	3 1/2	- 1/2	-12.5
O	KEYDATA CORP	7- 13	10 7/8	+ 1/4	+2.3
O	LOGICON	4- 9	5	+ 1/8	+2.5
A	MANAGEMENT DATA	4- 10	5 3/8	0	0.0
O	NATIONAL CCS INC	8- 31	29 5/8	+ 5/8	+2.1
O	NATIONAL INFO SVCS	2- 5	1 1/2	- 1/8	-7.6

P	ON LINE SYSTEMS INC	8- 28	26 1/2	+1 1/4	+4.9
N	PLANNING RESEARCH	6- 17	9 1/4	+ 1/2	+5.7
O	PROGRAMMING METHODS	20- 25	25 1/8	+ 3/8	+1.5
O	PROGRAMMING & SYS	1- 2	1 1/4	+ 1/4	+25.0
O	RAPIDATA INC	5- 27	26 1/4	+ 1/4	+0.9
O	SCIENTIFIC COMPUTERS	2- 4	1 7/8	- 1/8	-6.2
O	SIMPLICITY COMPUTER	1- 5	2 7/8	0	0.0

O	TBS COMPUTER CENTERS	3- 6	3 1/8	- 1/8	-3.8
O	TCC INC	1- 3	5/8	0	0.0
O	TYMSHARE INC	7- 11	9 3/4	+1 1/4	+14.7
O	UNITED DATA CENTER	5- 8	5 3/4	- 1/4	-4.1
N	UNIVERSITY COMPUTING	9- 20	12	+1 3/8	+12.9
A	URS SYSTEMS	6- 10	7 5/8	+ 1/4	+3.3

PERIPHERALS & SUBSYSTEMS

N	ADDRESSOGRAPH-MULT	34- 49	35	-3 1/8	-8.1
O	ADVANCED MEMORY SYS	12- 23	18	+1	+5.8
N	AMPEX CORP	5- 15	6 3/4	- 1/4	-3.5
O	ANDERSON JACOBSON	4- 8	4 3/8	+ 3/8	+9.5
O	ATLANTIC TECHNOLOGY	1- 11	1 1/4	0	0.0
O	BEEHIVE MEDICAL ELEC	1- 8	7	- 5/8	-8.1
A	BOLT, BERANEK & NEW	5- 21	13 1/2	+ 3/8	+2.0

N	BUNKER-RAND	9- 14	9 7/8	0	0.0
A	CALCOMP	9- 25	13 1/2	+3 3/8	+33.3
O	CAMBRIDGE MEMORIES	9- 15	12 3/8	+2 7/8	+30.2
O	CENTRONICS DATA COMP	6- 27	27	+3 1/2	+14.8
O	COGNITRONICS	2- 5	3 1/8	+ 7/8	+38.8
O	COMPUTER COMMON	1- 7	2 3/4	- 3/4	-21.4
A	COMPUTER EQUIPMENT	2- 4	2 7/8	+ 3/8	+15.0

O	COMPUTER MACHINERY	7- 13	10 1/2	0	0.0
A	COMPUTEST	3- 9	4 3/8	- 3/8	-7.8
A	DATA PRODUCTS CORP	3- 7	4 1/8	+ 1/8	+3.1
O	DATA RECOGNITION	1- 5	1 1/4	0	0.0
O	DATA TECHNOLOGY	2- 5	2 1/2	- 1/4	-9.0
O	DIJAN CONTROLS	0- 8	4 1/2	+ 1/8	+2.8
N	ELECTRONIC M & M	3- 8	5 1/2	+ 1/4	+4.7

O	FABRI-TEK	2- 5	3 3/4	0	0.0
O	GENERAL COMPUTER SYS	7- 16	7	0	0.0
N	GENERAL ELECTRIC	59- 70	69 5/8	+1 3/4	+2.5
N	HAZELTINE CORP	7- 13	9 1/2	- 1/8	-1.2
O	INFUREX INC	20- 36	25 1/8	- 5/8	-2.4
O	INFORMATION DISPLAYS	1- 5	1 1/2	+ 3/8	+33.3
A	LUNDY ELECTRONICS	8- 14	9 1/4	+ 7/8	+10.4

O	MANAGEMENT ASSIST	1- 2	3/8	0	0.0
A	MILGO ELECTRONICS	15- 44	25 3/8	+4	+18.7
N	MOHAWK DATA SCI	12- 27	14 1/2	0	0.0
O	OPTICAL SCANNING	6- 16	6	-1 1/4	-17.2
O	PERTEC CORP	8- 17	8 7/8	0	0.0
O	PHOTON	6- 15	7 1/8	-1 1/8	-13.6
A	POTTER INSTRUMENT	7- 21	10 5/8	+1 1/4	+13.3

O	PRECISION INST.	3- 13	4 3/4	+1 1/2	+46.1
O	RECOGNITION EQUIP	5- 15	9 5/8	+1 5/8	+20.3
N	SANDERS ASSOCIATES	13- 21	17 1/4	+ 1/2	+2.9
O	SCAN DATA	5- 13	5 3/8	+ 3/8	+7.5
O	STORAGE TECHNOLOGY	17- 39	31 1/8	+1	+3.3
O	SYCOR INC	7- 11	9 3/4	- 1/4	-2.5
O	TALLY CORP.	8- 15	10 1/8	+ 1/8	+1.2

N	TEKTRONIX INC	34- 64	52 1/8	+4 5/8	+7.7
N	TELEX	6- 15	7	+ 1/2	+7.6
O	WILTEK INC	10- 26	19	+1 1/4	+7.0

SUPPLIES & ACCESSORIES

O	BALTIMORE BUS FORMS	5- 9	4 3/4	- 3/4	-13.6
A	BARRY WRIGHT	9- 14	12 3/8	+ 5/8	+5.3
A	DATA DOCUMENTS	17- 26	21 7/8	+ 1/2	+2.3
O	DOUPLEX PRODUCTS INC	8- 16	9 3/4	+ 1/4	+2.6
N	ENNIS BUS. FORMS	6- 10	7	+ 1/4	+3.7
O	GRAHAM MAGNETICS	15- 27	15 1/8	+ 1/8	+0.8
O	GRAPHIC CONTROLS	11- 15	13 1/8	+1 7/8	+16.6

N	3M COMPANY	76- 86	83 7/8	-1	-1.1
O	MOORE CORP LTD	42- 57	55 1/2	-1 1/8	-1.9
N	NASHUA CORP	48- 62	58 1/4	+ 3/4	+1.3
O	REYNOLDS & REYNOLD	37- 77	49 1/2	+ 1/4	+0.5
O	STANDARD REGISTER	14- 20	15 3/4	+ 1/2	+3.2

E X C H	1972		CLOSING DEC 07 1972	WEEK NET CHANGE	WEEK PCT CHANGE
	RANGE (1)				

H	TAB PRODUCTS CO	14- 25	21	- 1/2	-2.3
A	VARCO	21- 28	23 5/8	- 1/4	-1.0
A	VARSH MAGNETICS	6- 11	7 3/8	+ 1/2	+7.2
N	WALLACE BUS FORMS	21- 26	25	+ 3/4	+1.5

COMPUTER SYSTEMS

N	BURROUGHS CORP	147-229	228 7/8	+13 7/8	+6.1
N	COLLINS RADIO	14- 24	23 3/4	+7	+28.1
N	CONTROL DATA CORP	43- 78	66 3/4	+5 1/4	+8.9
O	DATA GENERAL CORP	56-115	112	+8	+7.6
O	DIGITAL COMP CONTROL	5- 25	5 1/2	+ 1/4	+4.7
N	DIGITAL EQUIPMENT	72-101	92 5/8	+3 7/8	+4.3
"	ELECTRONIC ASSOC.	0- 13	0 3/8	- 3/8	-3.8

A	ELECTRONIC ENGINEER.	6- 14	8 3/4	+ 1/8	+1.4
"	FOXBORO	23- 41	32 7/8	+7 7/8	+15.3
"	GENERAL AUTOMATION	13- 39	36 3/4	+ 1/2	+1.3
O	GRI COMPUTER CORP	2- 5	2 3/4	+ 3/8	+15.7
"	HEWLETT-PACKARD CO	46- 78	78	+4	+5.4
N	HONEYWELL INC	118-170	132 7/8	+5	+3.2
"	IBM	333-426	396 7/4	+6 3/4	+1.4

O	INTERDATA INC	8- 16	16 1/4	+ 1/8	+1.2
"	MEMOREX	15- 38	19 7/8	+2 5/8	+15.2
O	MICRODATA CORP	5- 10	9 1/2	+1 1/2	+18.7
"	MCR	29- 38	32 3/4	0	0.0
N	RAYTHEON CO	27- 47	37	+1 1/2	+4.2
"	SPEERY RAND	30- 50	50	+2 5/8	+5.5
A	SYSTEMS ENG. LABS	7- 16	8 5/8	0	0.0

"	VARIAN ASSOCIATES	14- 21	13 1/2	+1 5/8	+3.0
"	VICTOR COMPUTERS	15- 24	17 3/4	0	0.0
"	WANG LABS.	23- 61	29 5/8	+3 1/2	+13.8
N	XEROX CORP	121-172	153 3/4	+4	+2.6

LEASING COMPANIES

A	BROTHIE COMPUTER	3- 18	4	0	0.0
O	BUSHNANIAN COMP.	1- 3	1 5/8	+ 1/4	+18.1
O	COMISCO INC	3- 18	13 1/4	- 1/4	-1.8
O	COMMERCE GROUP CORP	5- 11	6 1/2	+ 7/8	+15.5
O	COMPUTER EXCHANGE	1- 3	1	+ 1/8	+14.2
A	COMPUTER INVESTRS GRP	7- 14	8	+ 7/8	+12.2
N	UPF INC	5- 13	6 1/2	+ 1/2	+8.3

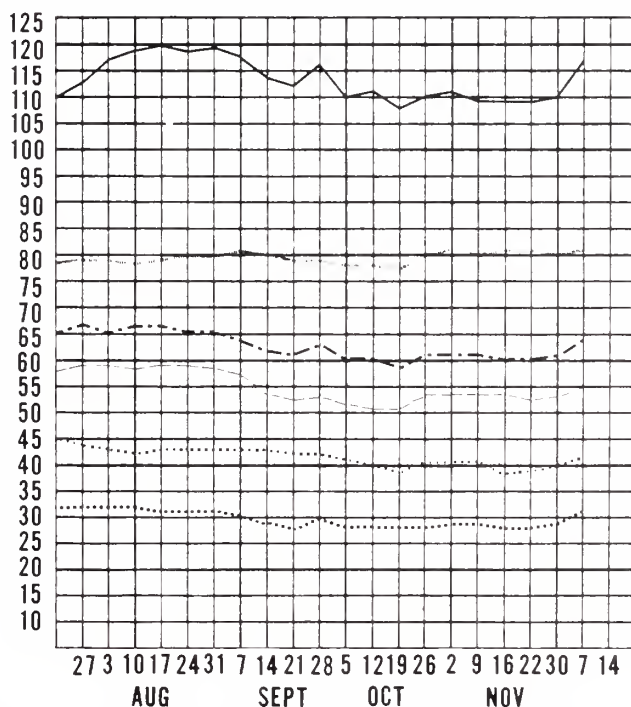
"	DATRONIC RENTAL	2- 4	2	0	0.0
A	DCL INC	2- 10	3 1/8	- 3/8	-10.7
A	DEARBORN-JORM	16- 26	21 1/4	-1 1/8	-5.0
A	DPA, INC.	5- 8	7 3/8	- 1/2	-6.3
A	GRANITE MGT	5- 11	5 3/4	- 1/8	-2.1
A	GREYHOUND COMPUTER	6- 11	6 5/8	+ 1/4	+7.1
A	ITEL	7- 12	11 3/4	+1 3/8	+13.2

"	LEASCO CORP	17- 24	22 3/4	+ 7/8	+4.0
O	LEASPACE CORP	6- 15	7 1/2	- 1/8	-1.6
O	ELECTRO RENT INC	1- 4	2 7/8	+ 7/8	+43.7
A	RUCKWOLD COMPUTER	2- 7	2 7/8	- 1/8	-4.1
O	SYSTEMS CAPITAL	3- 20	11 7/8	- 5/8	-5.0
N	U.S. LEASING	13- 33	29 3/8	- 1/8	-0.4

EXCH: N=NEW YORK EXCHANGE; A=AMERICAN EXCHANGE
L=NATIONAL EXCHANGE; O=OVER-THE-COUNTER
P=PHIL-BALT-WASH
U-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST B.P.
(1) TO NEAREST DOLLAR

Computer Stocks Trading Index

— Computer Systems ——— Software & EDP Services
..... Peripherals & Subsystems Leasing Companies
— Supplies & Accessories ——— CW Composite Index



Earnings Reports

COM-SHARE
Three Months Ended Sept. 30

	1972	a1971
Shr Ernd	\$.10	
Revenue	1,868,821	\$1,491,122
Tax Cred	662,000	
Earnings	123,473	(104,288)

a-Restated to reflect audited results.
b-Tax loss carryforward.

COMPUTER MACHINERY
Three Months Ended Sept. 30

	1972	1971
Revenue	\$8,633,000	\$2,522,000
Loss	248,000	1,262,000
9 Mo Rev	19,340,000	6,982,000
Spec Cred	a107,000	
Loss	2,328,000	3,045,000



Joy to the World

MY NEW YEAR'S RESOLUTION: "Unlike 1972, 1973 is the year I will consider applications software packages. Rather than spending hundreds of man-hours of programmer's time reinventing the wheel, I'll use them more productively and save money by sharing development costs with hundreds of users."

**THANKS TO OUR 400 USERS FOR A GREAT 1972.
BEST WISHES TO ALL FOR THE HOLIDAY SEASON AND 1973.**

Dear Santa, Please send me information on the following packages:

- ☐ FINANCIAL INFORMATION AND CONTROL SYSTEM
- ☐ GENERAL LEDGER AND RESPONSIBILITY REPORTING
- ☐ PAYROLL/PERSONNEL
- ☐ FIXED ASSETS

- ☐ ACCOUNTS PAYABLE
- ☐ INVENTORY CONTROL
- ☐ INSTALLMENT LOANS
- ☐ TIME DEPOSITS

NAME _____ TITLE _____

COMPANY _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

COMPUTER _____

TELEPHONE NUMBER _____

MANAGEMENT SCIENCE AMERICA, INC.

ATLANTA

3445 Peachtree Road, N.E.
Suite 1300
Atlanta, Georgia 30326
404/262-2376

CHICAGO

15 Spinning Wheel Road
Hinsdale, Illinois 60521
312/323-5940

SAN FRANCISCO

525 University Avenue
Suite 1220
Palo Alto, California 94301
415/328-1700

NEW JERSEY

580 Sylvan Avenue
Englewood Cliffs, New Jersey 07632
201/871-4700

Los Angeles

1900 Avenue of the Stars
Suite 1280
Los Angeles, California 90067
213/277-8411